The No-Mower Food Grower's Guide

Designing Edible Landscapes for the Wet-Dry Tropics

Acknowledgements

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About the authors

Dr Wendy Seabrook is an ecologist with 25 years experience applying her expertise to the regeneration of natural communities and food growing ecosystems and helping others to do the same. She is applying her passion for continuous learning to Hill Top Farm, a patch of paradise just north of Cooktown.

John Brisbin is a knowledge systems architect and local food activist with a life-long attraction to kitchen gardens. He and his family are growing soil, sustenance, and social networks in suburban MT Molloy, just a few hours south of Cooktown.

Roger Goebel is the developmental horticulturalist at Etty Bay Exotics. Roger has over 30 years experience in north Queensland and in tropical environments around the world. He is breathing abundant life back into a retired cane property south of Townsville.

Australian Government

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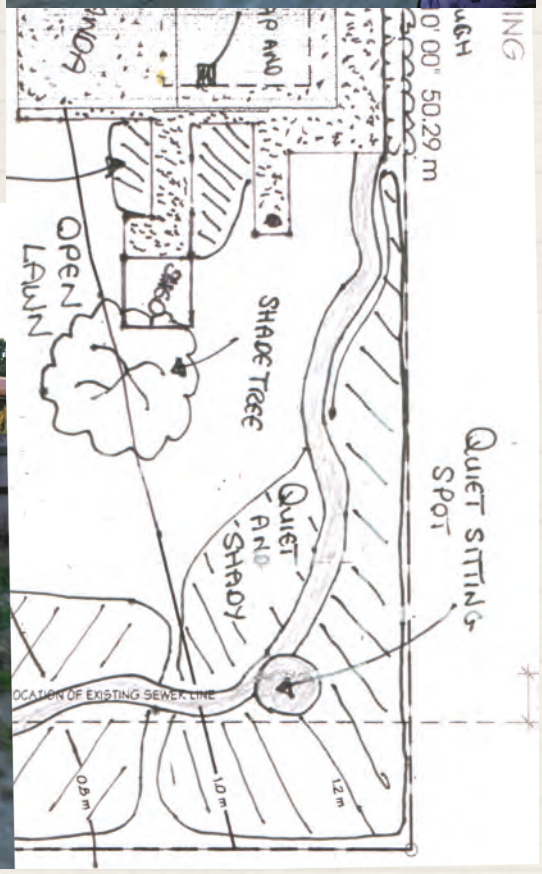
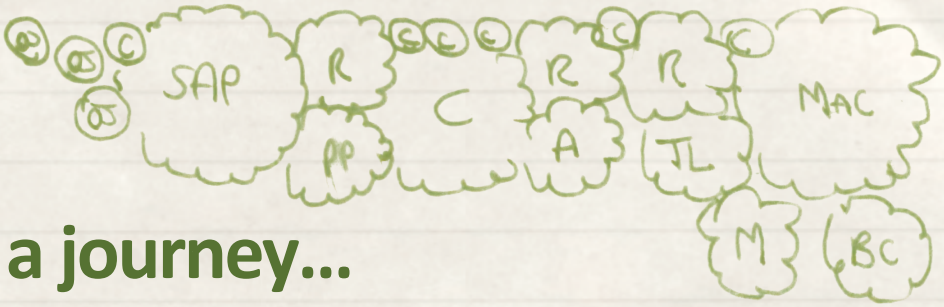
Contents

Photos and diagrams have been provided courtesy of the authors unless otherwise noted.





The start of a journey...

This handbook will help you start an exciting journey designing edible landscapes where working with nature is the key to growing food without lots of hard yakka. You can leave the mower behind.

We love to be surrounded by plants. We depend on them for food, they lighten our lives with their beauty, and they provide useful services like shade and shelter, and practically everyone has some experience with growing plants or with tending a garden.

Many people think growing food is hard work. It can be. But instead of working harder, we need to work smarter. This handbook will help you design edible landscapes where nature does most of the work.

> ***"You mean no digging! Just wandering through and foraging for food, doing a little bit of tidying here and there, just like our ancestors used to do....."***
>
> *comment from Housing tenant., on the journey to becoming an enthusiastic No-mower Grower*

Edible landscape design is more than just another way of growing food. What is important is that you are creating a way of growing food that mimics natural ecosystems.

This handbook will take you through a design process that can be used by people designing community gardens, orchards, market gardens and veggie plots, and for those folks who would like to go further, creating edible landscapes mimicking natural vegetation communities in their area. For it is in these food growing ecosystems that the real labour-saving benefits of edible landscaping are experienced. Maintenance jobs like weeding and mulching are reduced as the plants produce their own mulch. The diversity of species and interactions between them reduces pests and diseases. The food plants and their supporters, the legumes and biomass accumulators, work together to feed the soil.

If we can get the design right, and apply a little bit of attention in the right places, chances are good that the natural processes will take over and bear benefits for years to come.

Size doesn't matter

You can create edible landscapes on verandas, in back gardens, urban parks, along creek banks and footpaths, on street corners and acreages.

People have created food growing ecosystems in their shrubberies! Compared to conventional landscaping, these small-scale ecosystems can be more beautiful, more useful... and more edible.

Our goal is to help you create landscapes that:

- produce **food** and provide other products (natural dyes, basket making materials, etc) and **services** (wind breaks, privacy, weed barriers, etc);
- are so **attractive** and **relaxing** people love spending time in them;
- are **tough** enough to survive challenging times; and
- produce food even given virtually **no maintenance**, but produce more given a little tender loving care!

Map: QLD Government

The main communities in our region are Hopevale, Cooktown, and Wujal Wujal

Where are we? the Wet-Dry Tropics of Far North Queensland

This Handbook has been written for communities north of Cairns, on the eastern coast of Australia, in a climate zone referred to as the **Wet-Dry Tropics** (or Tropical Savannas)[1]. Temperatures range between 22-29C (avg). Rainfall however, is not moderated. The region gets nearly 2m of rain each year, but the monsoonal Wet concentrates 75% of the total in just 16 weeks. The rest of the year is pretty Dry.[2]

Our region is low, coastal: few sites would have more than 50m of elevation. And there are strong prevailing winds that can put stress on plants for weeks at a time.

Soils are typically poor, but there are exceptions on floodplains and sites with red volcanic soils. Have a look at the Soils Map for Cooktown : this will show that many potential edible landscape sites will need particular design approaches to compensate for our soils.

Ours is a **brittle landscape**. With the strong seasonality of hot/wet and cool/dry we must take special account of the natural conditions.

There is little biological activity in soil during the dry, so the break-down of organic material is very slow. This has major implications for landscape design as mulches and leaf litter from vegetation growing on the site won't get incorporated as well into the soil, reducing nutrient availability for plants, increasing the loss of nutrients into the air, and risk of fire.

In non-brittle landscapes rainfall, humidity and soil moisture keep micro-organisms and other soil animals active all year, eating and rapidly breaking down organic material.

Who are you, and what's your ideal low-maintenance landscape?

This Handbook is here first and foremost to increase the availability of fresh food for families in public housing. Food growing ecosystems can deliver this benefit while also reducing landscaping maintenance costs for housing providers and tenants. So we have developed this handbook with these people in mind:

- Public housing providers
- Works Managers
- Public housing tenants
- Landscapers, horticulturists and permaculture practitioners

You might be someone who lives in or maintains a public housing property. Your garden is probably grass and a few struggling trees. This "bomb-proof" approach to landscaping has evolved with the idea of reducing maintenance costs to the minimum.

What gets hidden in this picture are the costs associated with mowing lawns, tree lopping, rubbish removal, and spraying.

Plus there are indirect costs: without shade, air conditioning bills go up; without privacy screening or wind breaks, outside areas become harsh, semi-public spaces that discourage use as a garden.

In this Handbook we'll offer a practical alternative to the public housing community. We also hope the Handbook will find a following with:

- home gardeners
- community gardeners
- horticulturists

We can create edible landscapes just about anywhere. The abundance and beauty of a food growing ecosystem is something everyone can appreciate. In the design process following, you'll develop the skills and understanding to establish edible landscapes that are rich in ecological processes and functions and truly adaptive to your unique setting.

Learning by doing: our case studies

Throughout the design process we will refer to two real-world case studies in Cooktown. Much consideration has gone into taking you smoothly and creatively through the design process. At the same time we recognize the challenge this presents, so wherever possible we will connect the theory with on-ground reality.

Our main example is a development on John St, Cooktown, which comprises two small units on a typical quarter-acre block. The property is owned by a social housing provider and rented to members of the housing association. The other site, on Walker St, is also managed by the social housing provider. Walker St is a single family home on a quarter acre block.

Since many of the Association's housing tenants are either not keen gardeners or don't have the capacity to garden, we were asked to design very low maintenance gardens. The housing provider was keen to explore the benefits of food growing ecosystems because over the long term they would require less maintenance and help provide healthy food for the tenants.

We were asked to pay special attention to watering needs as irrigation is both expensive (tenants pay for water) and likely to be

John St Units in Cooktown are used as the primary case-study examples. These are typical of the landscapes we will be working with in this Guide.

neglected (plants would need to survive several months of dry season without watering). The gardens also needed to be cheap to establish, our site preparation and planting budget was $1000/garden.

You'll be able to follow along in the design process as we discuss our reasoning and consider various alternatives to meet the goals of the case-studies. Some people may use this Guide as a recipe book, but every site is quite different. The best strategy is to understand the underlying principles so you can apply them to any situation.

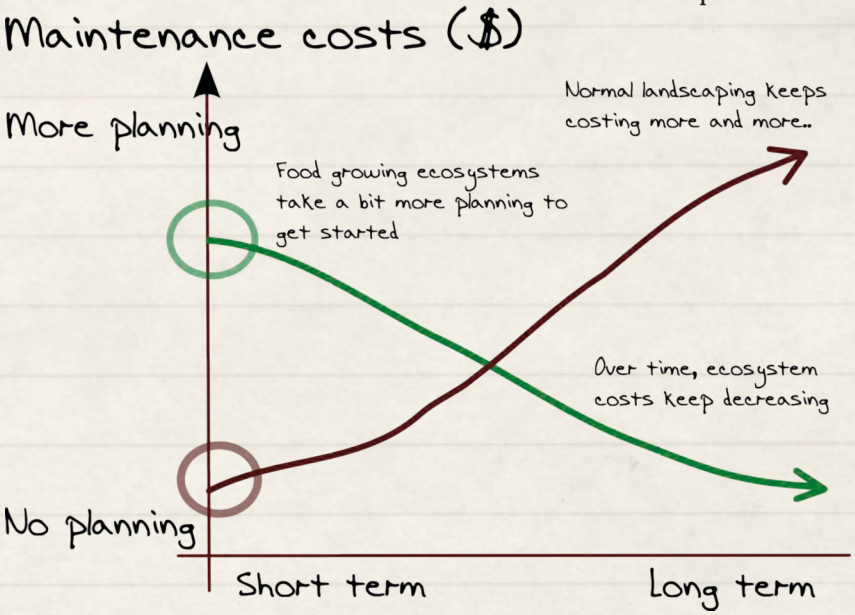
We hope that you will share the journey with us, using the design tools and sticking with the processes outlined to develop an edible landscape beautifully adapted to your local environment.

Reaping what you sow: building an edible landscape

There's an old wisdom that says "You get out of life what you put into it", and that holds true with edible landscapes the same as with anything else. Edible landscapes promise delicious benefits AND lowered costs…but that doesn't mean they happen by accident.

You will need to spend some time up-front assessing the site, having fun creating designs, deciding where to put the veggie gardens, BBQ, fruit trees and secluded places where people can sit and enjoy being in their gardens.

You can decide how much money, time and energy will be available to put into your edible landscape and design it accordingly. Keen gardeners may have time to maintain intensive veggie beds and orchards, but for busy families replacing lawns with food growing ecosystems can mean access to healthy food, a lot less garden maintenance and goodbye lawn mower!



The relationship between up-front effort of planning versus the longer-term benefits of lowered maintenance costs. Early effort pays off year after year.

Food growing ecosystems are more than just another way of growing food. What is important is that you are creating a way of growing food that mimics natural ecosystems. This is done by creating layers of vegetation (for example ground covers, shrubs, vines and tree canopy) similar to a forest. Layers help to support a diversity of food and other plants adapted to the conditions on the site while providing the functions needed to create a healthy and resilient ecosystem.

Healthy natural ecosystems, from rainforests to desert scrublands, don't need a maintenance contractor to buy and spread mulch and fertiliser, they do it themselves. Leaves fall continuously from above, adding free, endless sources of mulch, feeding organisms in the soil. This sort of self-management

Food Forests verses Food growing ecosystems

Aren't food growing ecosystems just the same as permaculture food forests and Edible Forest Gardens?

Yes they are, in many locations, as forests are the dominant native vegetation community in many areas, but not all. There are many other vegetation communities, for example in the dry tropics open woodlands, scrublands, heathlands, herblands, tussock grasslands and so on. Our goal is to create food growing ecosystems that are self-maintaining. To best achieve this we need to mimic the ecology and architecture of the vegetation communities that would have naturally occurred on our site, not specifically forest communities.

Permaculture food forests were first planted in subtropical forest landscapes and the term Edible Forest Gardens was first coined by Dave Jacke, for food growing ecosystems in temperate areas of the United States, another forested landscape.

is what we aim for in food growing ecosystems.

These systems are more resilient because of the diversity of plants, animals, insects, fungi, bacteria and other organisms, and the amazing complex interactions between these organisms and their environment. Some plants have bacteria in their roots for collecting nitrogen from the air. Some plants are deep-rooted, bringing nutrients up from the depths. Flowering trees and shrubs feed populations of beneficial insects, ready and waiting to control insect pests.

In a food growing ecosystem the amount of food produced per plant may be less than intensive veggie gardens and commercial orchards, but if the food growing ecosystem is well designed and given a little care and attention, more food may be produced overall, and without all the fertilizer and other inputs these conventional systems require.

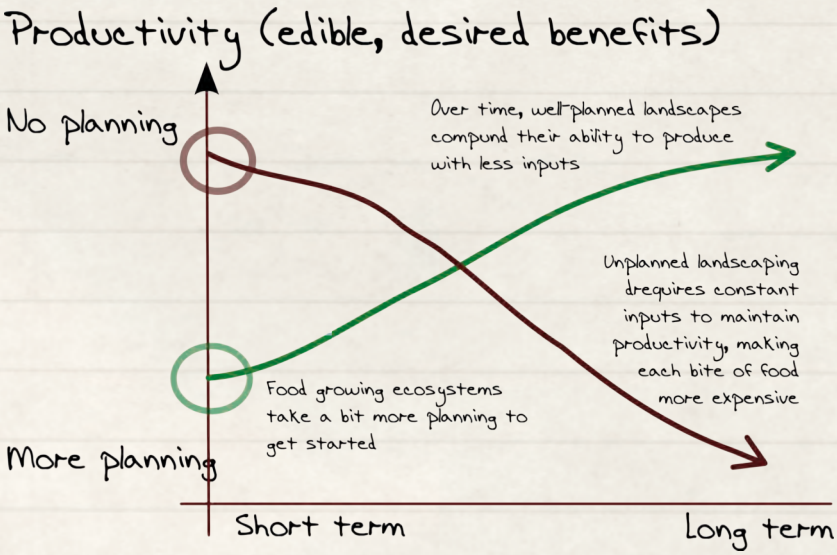
You will have unique design challenges, depending on where you are creating your edible landscape, some that you may be already aware of. Let's not allow these challenges to stop us from getting out there and having a go as there will always be benefits from designing food growing systems working with nature. In this handbook we have responded to the challenges of the dry tropics by providing specific ecological functions, plant forms and guidelines for site preparation and maintenance.

Growing knowledge from deep roots and fertile minds

Edible ecosystems are not recent creations. For example we can still see evidence of 2,000 year old date palm food forests in Morocco[3] and, in Java, home gardens developed as food forests are a living tradition that date from ancient times.

A leading researcher and activist in the food forest movement is Dave Jacke. Jacke, together with colleague Eric Toensmeier, has published the key reference book in two volumes under the title E*dible Forest Gardens: The Ecology and Design of Home-scale Food Forests*[4].

Jacke has developed a deep knowledge of natural systems gained over two decades of designing and learning from the forest gardens he created in North America, and seven years researching ecological science and its application to creating food growing ecosystems. The resulting landscape design toolbox is an amazing asset with general relevance to all landscapes. Jacke's main experience is in temperate climates, so his work is naturally oriented to that context. To our knowledge there is no comparable work whose focus is on the special demands of tropical climates.



The relationship between food growing ecosystems and their capacity to deliver more food with less input from us.

We have taken much guidance from Jacke's work in developing this Handbook and will provide you with cross-references wherever practical. There is considerable detail and theory in his book that we cannot replicate here. This Handbook is a starting point for the adventures of creating food growing ecosystems in the wet-dry tropics.

Many people would also be familiar with the principles of Permaculture, another ancient design strategy which was popularised by Bill Mollison and David Holmgren. We refer to the insights of permaculturalists in this Guide.

Creating opportunities: funding your niche

In general, public housing administrators have only modest budgets available for landscaping, and there are limited opportunities to fund edible landscaping projects in the public housing context.

You will need work a bit 'outside the square' to secure the resources you need. Here are some thoughts to help get you started.

Leveraging funding by reducing maintenance costs

You may be able to leverage funding by demonstrating how edible landscaping can reduce maintenance costs. Ideally, you want to produce a "fully-costed comparison" between the typical bomb-proof landscaping option vs the edible landscape option. The cost comparison should show how things that we are accustomed to paying can be substituted and replaced. There are many services and amenities that can be delivered for free through a

Perennial coriander. Shallow-rooted clumping ground cover that provides beautiful salad greens year after year.

clever, systems-oriented approach to the landscape.

Look for help on energy audits and estimating the cost-savings calculations for various interventions. How much does it cost to fuel, service and replace maintenance equipment like mowers and brush cutters, replace guttering and fencing? What household energy costs can be saved with landscaping? Your local community environment centre may have information or expertise on energy conservation.

There are some emerging movements like the Transition Towns and the climate change adaptation strategies that may be useful here.

Once you can get all the figures into a spreadsheet, you're in good position to make a case to your executive, trustees, or key funders to approve the investment in edible landscape strategies.

Direct Grants

Look under community health programs for funding that encourages health diets, outdoor activities, multigenerational engagement, cultural maintenance and support, etc. All of these objectives can be attached to a well-considered edible landscape program.

Climate change adaptation schemes are going to be more common in coming years and edible landscapes make an excellent pitch.

Community garden grants may also be a possibility if creatively pitched. For example shared landscaping could be seen as a form of small-scale public space improvement. Neighbours in a cul-de-sac might be interested in co-tending an edible ecosystem project on a verge or other common space.

Specifications in the Tender

Housing providers can require Edible Food landscaping through the tendering process for new residential developments and upgrades. This has to be handled carefully and with legal counsel. It should be a reasonable challenge to your contractors to lift their game and provide this approach to landscaping as an affordable alternative. By stipulating this in the contract, the mandate is established.

Lobby for a Legislative requirement

This is a longer-term, big picture approach, but it helps to at least keep it on your radar. While Residential subdivisions may require landscaping for public land within the subdivision, as yet there is no statutory requirement for landscaping for developments or upgrade of residential properties except for driveways, fencing and paths. The only exception (in Queensland) is for Material Change of Use (MCU), for approval of dual occupancies on single dwelling blocks.

Erosion control

For all construction and landscaping activities in Queensland, a person by law, must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm (*Environmental Protection Act 1994* s. 319). Developers therefore need to ensure their activities during and after construction do not cause erosion resulting in environmental harm.

One of the most important methods of erosion control is having erosion resistant ground covers especially grass and mulches. While not directly enabling funding for edibles, it may be possible to encourage or find opportu-

nities to extend the funding further to pay for additional landscaping, especially if the landscaping will reduce grass establishment costs.

Depending on the funding cycles of the relevant natural resource management group, it might be possible to approach them for a works grant to control erosion, re-establish productive bush, and encourage biodiversity. For our region the Cape York NRM[5] is the appropriate contact.

Other opportunities

- Donations of plants and planting materials from nurseries, friends, farmers
- Fund raising
- Work experience activities
- Remote Jobs and Communities Program
- Permaculture makeovers, perma-blitz
- WWOOFER / HelpX volunteers

Stepping stones

The Handbook is organised around these steps in the design process:

- Setting goals: What do you want to achieve?
- Site Survey: the Ecological Realities
- Designing an Edible Landscape
- Planning, Plants, and Patches
- Digging in

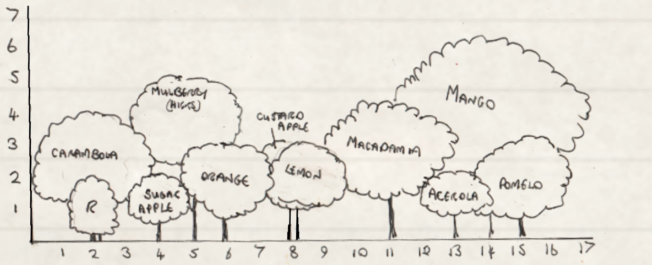
[1] Wet and Dry, or Savanna climate. See: http://en.wikipedia.org/wiki/Köppen_climate_classification; ref to: http://www.worldcat.org/title/physical-geography-a-landscape-appreciation/oclc/43724491&referer=brief_results; also Cooktown climate and more at: http://en.mobile.wikipedia.org/wiki/Cooktown,_Queensland

[2] Temperatures and Rainfall at Cooktown Post Office. http://www.bom.gov.au/climate/averages/tables/cw_031016.shtml

[3] Morocco Food Forest, https://www.youtube.com/watch?v=hftgWcD-1Nw

[4] Jacke, Dave. http://www.edibleforestgardens.com/about_book

Step 1: What do you want to achieve?



Our first step is to get a clear picture of what we're trying to achieve. This will become our **Goal Statement**. Later in the process, we will come back to the Goal Statement and cross-check it with the design that is taking shape in Steps 2-4.

Goals can be tricky to write down, but that's part of what makes this exercise so valuable. It really focuses our thinking on what we want to achieve.

By documenting our motivations and expectations for this project, we'll be much better able to work through compromises, challenges, and unexpected opportunities later on.

Be honest about how much maintenance you will be interested in doing or, from an organizational point of view, have the capacity to carry out.

Where to start?

First, get the right people involved. Are you doing your landscaping project on your own or as part of a community? Would this be a more interesting project if neighbours, family, or friends were involved?

If this is your job, do you have any stakeholders to talk with and bring along on the journey? You might wish to try the process out by yourself first, get a feel for how it works, and then involve others. It's a personal choice, but make sure you've taken steps to involve anyone who needs to be part of the process. Landscapes by their nature are a bit "public"...and you're creating a lasting community benefit by cultivating an edible ecosystem.

If you're a visual thinker get a big sheet of paper and some good markers.

If you're better talking ideas through, set up a situation where you can talk things over with others.

Our goal in this step is to consider the project thoroughly enough to write down the most important benefits that we expect from the edible landscape.

Some ideas to tickle your thinking

For public housing providers the main goals may be to give tenants improved access to healthy food, support community healthy eat-

Limited finances?

Your goals may be limited by your finances. Keep in mind, that edible landscapes can reduce future maintenance costs like mowing, weed and vine control, cleaning guttering and tree lopping, together with reducing purchasing and servicing costs for the equipment used. By creating designs reducing these costs, you will be better placed to justify the up-front landscaping costs.

See also **Creating opportunities: funding your niche**.

A blank slate. The author considering the possibility of open grassland as natural ecosystem type!

ing initiatives, and help families on low incomes with their food budgeting. It may be equally important to create landscapes that are low maintenance.

Are there any landscape features that are a priority?

Do you want to leave room for veggie gardens, create a play space for children? How much of the landscape do you want to use for your food growing ecosystem?

Identifying the food you want to grow could be another way of deciding what you want to achieve.

What do the people using the garden like to eat? What popular foods could be grown that are rarely on the supermarket shelves?

Edible landscapes work better when people spend time in them, chatting with family and friends, foraging for food, watching birds.

Do you want to leave room for shady sitting spots, a BBQ area, or just room to catch a nice view of the sunset or sunrise? Does the landscape need plantings to reduce the noise and visual intrusion of a busy road?

There may be more ideas that come to mind. You can always revisit and revise the Goal Statement. The main thing is that the goals are kept close to hand so you can refer to them when making design decisions.

Finding the right look

In your goal statement also describe what your edible landscape will look and feel like.

Would you like open areas with just lawn, shrubberies, and paths that meander, or do you prefer straight paths going from A to B?

Will the landscape be an open space or private and cosy? Do you want your fruit trees in rows with nectar producing shrubs in the windbreak or a mixed planting?

Or are you prepared to design a food growing ecosystem, mimicking the structure and ecological characteristics of the native vegetation likely to have originally grown on your site?

Remember that in many areas of the wet-dry tropics we don't have all the layers of vegetation found in rain forests. Generally our trees are spaced out, creating a more open canopy. We could re-create a rainforest structure and use food plants that originated in rainforest environments, but we would have more maintenance to keep this type of 'displaced' ecosystem thriving.

If you are going to include a food growing ecosystem in your landscape, this is a good time to think generally about your preferences for vegetation types and what type of vegetation would have naturally occurred on your site. In our area the most likely types are:

- Savanna (open woodland)
- Rainforest and vine thickets(dense vegetation)
- Open forest and low open forest
- Tropical Eucalyptus woodland/grasslands
- Scrublands
- Melaleuca forest and woodlands

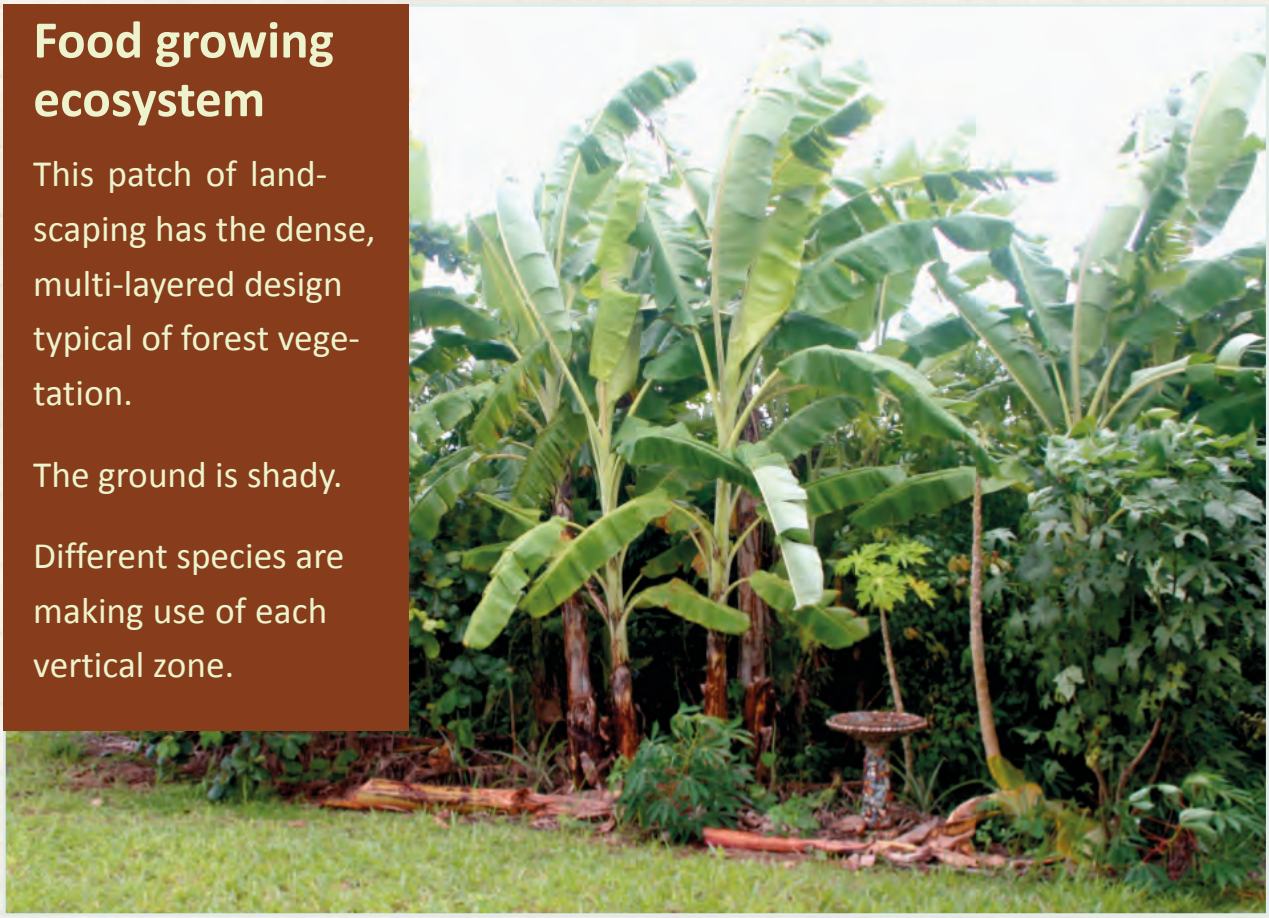
Describing the vegetation type you are most interested in designing will help you later on. Other people can more quickly grasp the concept behind your designed ecosystem.

Food growing ecosystem

This patch of landscaping has the dense, multi-layered design typical of forest vegetation.

The ground is shady.

Different species are making use of each vertical zone.



Goal Statement Worksheet

The form below is an example of how a Goal Statement might be documented. It's just one idea of course: work with your preferred means of expression.

Our role in John St was to act as advisors to the housing provider. Since the property was empty, we could not consult with the residents. Instead we picked out the main goals based on the operational and physical aspects of the property.

We had a similar goal statement for Walker St. The main difference being that as a family house we wanted to provide a lawn for kids to play on.

Each Goal Statement will look a bit different based on the circumstances. The main thing is that it serves as a good cross-check later in the project to make sure the design is staying on course.

Goal statement for John Street

1. Food growing ecosystems should cover the whole site (no requirement for lawn).
2. Plant and material must cost less than $1000.
3. Ensure that the landscaping requires little maintenance or watering during the dry season.
4. Provide some relief from strong prevailing southeasterlies.
5. Landscaping should provide food all year round.
6. Landscaping should provide a place the tenants like to spend time in.

As the emphasis is on low maintenance, the structure will mimic the natural vegetation that would have grown on the site – open woodland, with only about 40% tree canopy cover, shrubs, herbaceous and ground cover layers of vegetation, all planted with tough, drought-tolerant species.

Forms like this one are easy to produce in a spreadsheet program like Excel or OpenOffice Calc. Make up your own, or download these samples. Go to the Cook Shire Council home page, and search for *No-Mower*

Goal	Very important	Interested	Not so important
Growing food for snacks and casual harvest			
Growing food for main meals			
Growing plant products (eg, for dyes, herbal medicines, etc)			
Providing outdoor living spaces			
Creating a gentle microclimate			
Creating privacy			
Creating an attractive landscape (flowers, birds, etc)			
Reducing garden maintenance tasks			
Reducing housing maintenance costs			
Reducing air conditioning costs			
(other?)			
What will the edible landscape look like?			
What emotions/feelings would you like people to experience?			
What natural vegetation community will the ecosystem imitate? Identify something like open woodland, dense vegetation, etc.			

Sweet Potato

There are many varieties of sweet potato, and everyone has their favourite. Whether it's the orange fleshed kumara, the purple skinned white fleshed one, the white skinned purple veined one, the white skinned white fleshed one, or other less common varieties, they're all good. Sweet potatoes with orange flesh are high in beta-carotene and help to make vitamin A available in our bodies. The varieties with purple skin or flesh contain antioxidant and anti-inflammatory compounds. So instead of buying expensive blueberries from the other end of the nation (or of the world!) plant some local sweet potatoes and you'll be doing yourself even greater good.

Sweet Potato Salad

For two serves allow:

- **1 medium purple skinned or purple-veined sweet potato**
- **1/2 medium ripe red papaya or 2 mangoes**
- **2 limes**
- **4 passionfruit**
- **yoghurt to serve**

The night before while making dinner, cube the sweet potato into 1cm pieces. The white flesh will oxidise and brown quickly so if you want to avoid this, rub the slices with a cut lime as you go. Place the cubes into a steamer over already boiling water and steam for about 15 minutes until the cubes are cooked through.

Take off heat and place sweet potato into a container and squeeze the lime juice over and toss through well. Leave to marinate for about 1/2 hour, tossing occasionally if you can. After that, pour off any excess lime juice and place sweet potato in the fridge. This mix will keep happily for several days, so you can increase the amount you cook at one time and have enough prepared for several days breakfasts.

At breakfast, peel off the bits of skin if you want (leaving them on overnight allows the healing purple substances to soak into the flesh). For each person place the cubes of 1/2 a sweet potato into a bowl and cube a 1/4 of a papaya over them, then the pulp of 2 passionfruit. Serve with yoghurt if you like.

SWEET POTATO

Ipomoea batatus

Numerous selections based on plant growth, leaf shape, root shape, colour, size flavour and nutritional values.

Height		running ground cover,vine
Width		

Plant cuttings near surfacec and mulch well.

Excess growth can be trimmed.

Sun Tolerance	Wind Tolerance	Min Water
sun and shade	hardy	bi-monthly

Drainage	Soil needs	Root depth
must drain	rich	medium

Key ecological functions

Nutrient accumulator	Fast growing	Good Bugs	Weed suppression
Nutrients	Fast growing	Shelter	Weed stopper

Step 2: Surveying & assessing the site

In the previous section we looked carefully at our own goals and motivations. In this section we will look carefully at the characteristics of the site.

This section will discuss surveying and collecting information on the environmental characteristics, existing infrastructure, and any constraints and opportunities provided by the site.

Completing this step will give you information needed to design an edible landscape in tune with nature. The landscape will be in tune with the daily and seasonal patterns of sunlight, where runoff collects, where there is good soil and so on. You'll assess the best locations for landscape features. Spending time now will save you time, energy, money and disappointments down the track.

Since this step involves creating a map, you'll need to assemble your preferred tools. Some large sheets of paper, pencils, a rubber, and tracing paper. Computer whizzes may like to transfer their field maps onto computer using drawing, or landscaping software, but hand drawn diagrams work just fine too.

Keep in mind what you want to achieve. It will help focus your thinking on just collecting the information you need and to what level of accuracy. Even if you're only planning to landscape a portion of the site, an overall survey will help you get the most out of the project.

An overall survey will help accommodate future stages of landscaping and placement of features like veggie garden, BBQ area, or pond.

Creating a Site Plan

The starting point is to draw a plan of the site to scale. If you can get a copy of the original surveyors or builders plan for your site that will save you time measuring.

It's important to show the positions and dimensions of existing buildings and other fixed structures, plus the services into and across the site. You will use this plan as a base for a series of "overlays" that highlight specific characteristics of the site.

Locating underground services

Don't do any digging before locating and mapping the major underground and above ground services for the site. This is important to avoid damage during landscaping activities, and also later on to avoid issues with roots destroying underground piping and trees growing too tall under power lines.

The typical services you'll need to locate include:

- Telephone
- Power
- Sewerage
- Stormwater

Unfortunately it is not always easy to locate underground services unless you can get accurate advice from the builder, service contractor, etc. It is worth checking with the property owners to see if they can offer guidance.

If you're lucky the locations of the services may be shown on the builder's plans or the housing provider may have collected the

information. If not, Dial Before You Dig will arrange for the utility companies to send plans, but they will only show where the services enter the property. This is helpful, but there is no guarantee that the services follow a straight line from the boundary to the dwelling.

You may be able to hire a cable locator, but you need a qualified person to operate it.

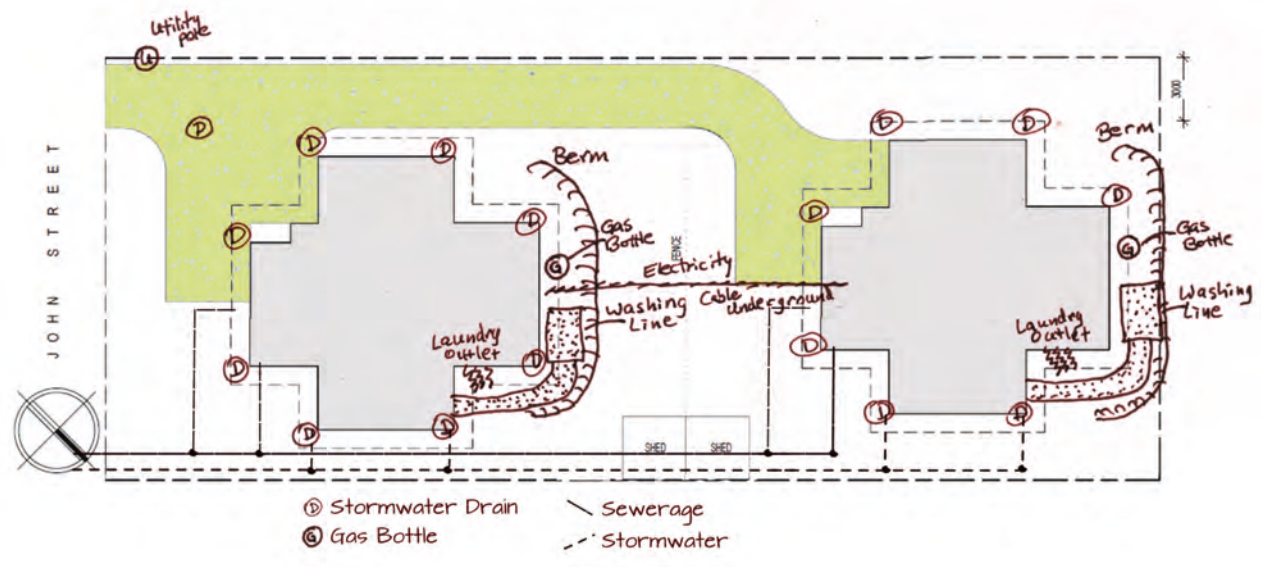
A few clues...

- Electricity cables are above ground for most residential properties, but if the dwelling is more than 22m from the boundary, the cable will go underground from a pole near the edge of the property to the house. You can usually see where the cables come out of the ground and up the side of the house. Electricity is generally buried at least 600m below ground with orange warning tape above.
- Telephone lines don't have the same warning tape as electricity. They are often buried at a shallow depth and can be just a single black wire running through the soil, easily cut by a gardener's shovel.
- Water supply comes in via a meter. Look for it along the front of the property. You can sometimes get a clue of where the service is run by looking at where the plumbing is connected into the house.
- Stormwater and sewerage pipes usually extend 2m from the dwelling at about 300-400mm depth and then drop down deep enough so that are usually not a concern for landscaping
- Irrigation lines: best option is to check with the owners and tenants

We were able to get the site plans for both of our sites and information on the locations of all the underground services from the developer for the John Street units.

Here's how we have shown the services and a couple of infrastructure items like the berms, laundry drain and clothesline.

Site survey: Underground services and infrastructure



This is our site plan for John St. When drawings are oriented so we're looking down from above we call them "aerial views". We'll use this sort of view extensively in the rest of the Guide.

Ways with Papaya

Really? A savoury soup made with ripe papaya is not something most people would expect to work, but I promise that it does. It is a refreshing, aromatic soup which I prefer to make with the red papaya because of its deep salmon coloured flesh, sweetness and beautiful aroma. The enzyme papain that is present in papaya is excellent for our digestion, so this is a great soup to serve prior to a meat main course.

At Christmas time when we can tend to indulge a bit too much, it is great to eat lots of papaya and pineapple, as both fruits assist our digestion because of the enzymes they contain. Another great starter to consider for Christmas is a long slice of papaya, wrapped in a thin slice of prosciutto. This is a variation on the Italian recipe of melon with prosciutto, but papaya works just as well, and gives your belly an extra helping hit of digestive enzymes in the papain in readiness for the feast ahead!

- **1 tsp finely grated ginger**
- **1 medium red onion finely chopped**
- **30ml coconut oil (or peanut oil)**
- **½ tsp ground coriander**
- **½ tsp flaky salt**
- **425g coconut milk**
- **2 kaffir lime leaves**
- **2 lemon myrtle leaves (or substitute with a bruised knot of lemongrass)**
- **1 large or 2 medium ripe to very ripe papaya (about 4 cups pulp)**
- **1 cup of mild lemon myrtle or lemongrass tea, or vegetable or chicken stock**
- **2 Tahitian or 4 small limes**

Clean inside of papaya of seeds and membrane. Heat coconut oil in a saucepan and add ginger and onion. Saute on medium heat until onion is soft. Add coriander and saute for a minute until aroma is released. Scoop papaya pulp into pan and cook, stirring regularly, for about 15 minutes until the papaya has thickened slightly and intensified in colour. Add salt and kaffir lime and lemon myrtle or lemongrass leaves, torn along each side of leaf to release flavour.

Continue to cook and stir for up to 5 minutes or until you smell the kaffir lime and lemon myrtle. Add coconut milk and up to 1 cup of lemon myrtle or lemongrass tea or stock at this point if you want to thin the consistency of the soup, and heat through. Remove from heat and push through sieve or food mill to create a smooth texture. Taste for salt and add a little more if necessary. Return sieved soup to reheat briefly. Squeeze juice of ½ a lime into each bowl and pour soup over.

Creating a set of theme maps

Now you are ready to create set of theme maps as overlays to highlight specific characteristics of the site, such as:

- climate
- existing vegetation
- sun, shade,
- wind exposure
- soil, drainage
- views, privacy

Trying to survey all these factors at one time would be overwhelming.

Landscape designers have learnt from experience that it is easier to focus on one theme at a time when surveying a site. Collecting information and mapping one theme saves your head getting muddled trying to do lots of things at once and it generally improves the quality of information gathered.

We found that using tracing paper or a light table (or a sunny window) makes it easy to create each theme map as an overlay on top of the site plan. Another approach is to make photocopies of the site plan, one for each of the themes you are mapping. Whatever works best for you. It's often a juggling act deciding how to group your themes on different maps, and how much detail to record, but the most important thing is that the thematic maps help you assess the site with respect to your project goals.

For example, on our case-study sites we wanted to provide a diversity of food plants with capacity to significantly improve the diets of the housing tenants.

To keep food production high, sufficient water is needed, and that poses a design challenge given our seasonal wet-dry climate and the cost of town water. With this constraint in mind, we realised it was important to "zoom in" on the details of water sources, natural accumulation areas, and water movement and drainage across the site.

Theme: Climate

Climate obviously has a big influence on creating landscapes. The key factors are rainfall, temperature, and sunlight exposure.

These factors can be measured and expressed in various ways, like annual rainfall, monthly mean rainfall, etc. It's a good idea to become familiar with the climate details for your area. You can get summaries of the local climate from the Bureau of Meteorology.

Got a great idea? Save it!

While you are doing these surveys you will have some inspirations about how the final design might look. Fantastic! Capture the ideas in a separate notebook so they don't get forgotten, but don't do anything with them at present.

Good design requires time and care. If you move too quickly into final design solutions you may find that a lot of effort gets wasted when you want to change to a better option. So hold off on the solution design for now: just do the surveys first and follow the steps!

What's in the soil?

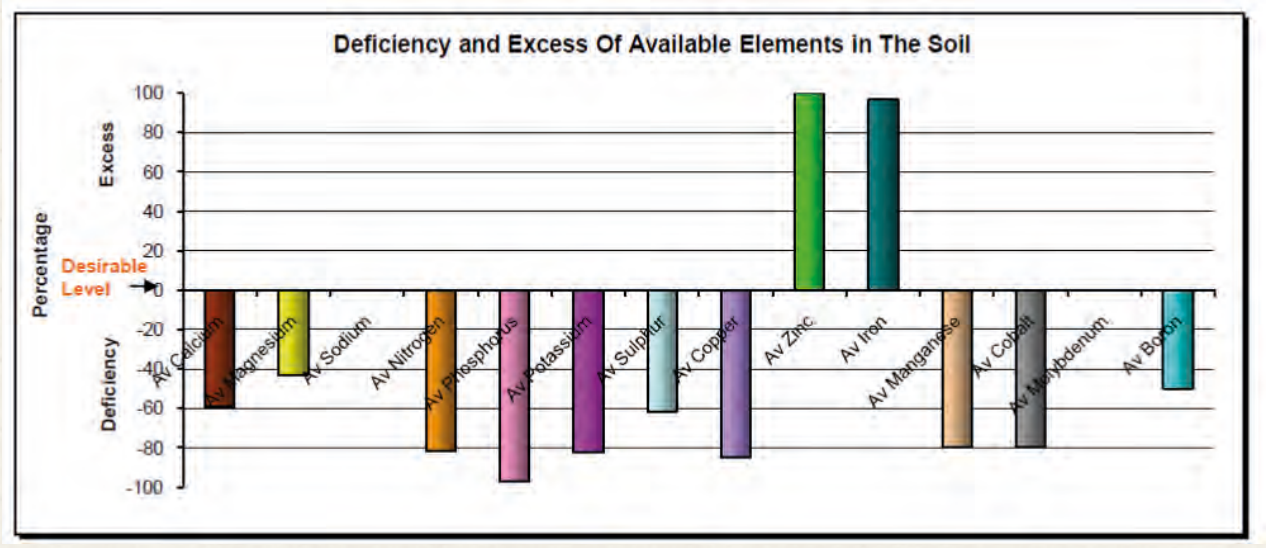
You want to know the physical, biological and chemical health of the soil. Physical and biological assessments can be done with a bit of help from online resources (see Getting more Information).

Soil chemical tests are best done by a lab. These tests are an up-front cost, but they can be well worth it. Deficiencies in plant nutrients may severely limit plant growth on the site. If you don't know what they are you could end up paying money unnecessarily on fertilisers and minerals that don't target the problem. Ask around, check to see if the soils in the neighbourhood have been tested recently.

Soil tests are best done by independent analysts, not linked to fertiliser companies. Their results will give you the levels of organic matter, major plant nutrients like nitrogen and phosphates, micro-nutrients (crucial nutrients needed by plants in small amounts), pH and other useful stuff.

You can then compare the levels in your soil with their recommendations and buy exactly what minerals and fertilizers are needed to repair your soil as part of your site preparation.

Cooktown Sandy Footslope. This is a sample of the analysis that comes back from the lab. Note how these soils have specific mineral deficiencies that can be targeted for improvement.



Theme: Water & Landform

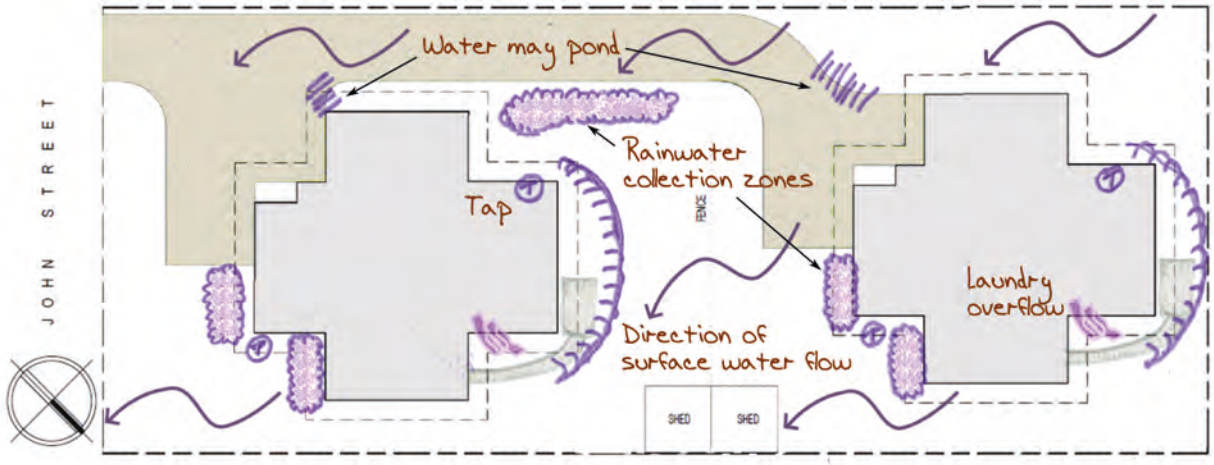
Water is a very important theme for any edible landscaping project, but especially for wet- dry climates where it may not rain for months. The water overlay can show all sources of water, including:

- taps
- bores and wells
- run off from roofs
- surface runoff from adjoining land
- ponding

A designer's eye can spot interesting issues and opportunities. For example, the building may have no guttering. In the Wet, this means a hammering cascade of water will flow off the eaves during rain storms. It also means that during cool nights, the eaves will be an important source of moisture as the dew drips from the roof.

Check to see what opportunities there are to use greywater and stormwater. Also what opportunities there are to reduce runoff using berms, and keyline ploughing and swales on larger sites, or by using simple absorbent structures like, lining the edges of

Site survey: Water & Landform



Site characteristics

Sources of water: Two garden taps for each unit.

No free town water - $1.75/kilolitre. Quality poor – chlorine. Surface water flow from W corner .

Some rainwater collection from wall on SE side of units and on SE side of dividing fence if rain blowing in from the SE.

Drain under decking to take water if laundry floods. Some ponding of water where runoff trapped by concrete driveway and concrete base to fence. Concrete driveway directs runoff as shown.

Limitations: W side of fence and NW sides of units rain shadow when rain coming with SE winds. Less rainfall under eaves, especially on non-SE facing Walls. No irrigation.

All roofs with guttering therefore no stormwater on site.

Land form: Not steep, but some erosion where no veg cover. Berm 10cm approx deep dug to stop surface water running under units.

Summary and Potential design solutions

Could the laundry overflow be adapted to provide grey water ?

Concrete paths to clothes line = permanent berms? Plants requiring more water in ponding and where more rainwater?

Simple earthworks associated with plantings to create swales to capture surface runoff?

Ground cover plants will trap and reduce runoff. Increase organic material on and in soil – more water holding capacity.

More shade and wind breaks to reduce evaporation losses.

non-absorbent surfaces like paths and driveways with gravel trenches. We will talk about techniques to increase the water holding capacity of your soil and reduce evaporative losses when we discuss site preparation.

Landform is the shape of the site. The shape of your site will affect human and vehicle access, aspect, erosion potential, and drainage.

Not much topsoil left at Walker St.

Drainage is the movement of water into and across the site. Look closely at the landforms, and use arrow to show the drainage patterns, where ponding areas may occur, the location of dry areas, and where there may be water erosion issues.

Surveying a site for landform can get quite complicated, but for most edible landscape designs you only need to indicate the direction and steepness of slope. We included slope information in our water base maps, as drainage was the most important factor influenced by slope on the sites.

Showing slope and water sources together often works well on the same theme map. You can see from the slope direction and steepness how water will move across the site and where it may pond.

Theme: Existing vegetation and wildlife

Have a look at the existing vegetation and for any signs of wildlife on the site. Map out individual trees and shrubs, garden beds, groups of plantings, ground covers. If the trees and shrubs are not dangerous or damaging services (or likely to in the future), and the ground covers non-competitive, have a chat to the housing provider about retaining these resources. The housing provider may need to make provision for this in their agreements with any contractors doing building works on the property.

Check that the site does not have:

- any invasive and Declared plants. Declared plants are targeted for control under state legislation and are species that have, or could have, serious economic, environmental or social impacts (see Getting More Information).
- plant species listed under State and Federal legislation as threatened. These can include Threatened, Vulnerable, and rare species, depending on the terms used, or
- remnant vegetation listed under State and Federal legislation

If the site does have this vegetation, get advice on managing it from your relevant State Government department.

What do the existing plants tell you about the conditions found on the site? It may be worthwhile doing some research on their environmental requirements to help you better read the site. You may notice that the vegetation changes across the site, even the grass. This can be a strong indicator of different microhabitats for plants and animals due to differences in soil, aspect or drainage. Mark these on your map and consider how to make use of these natural configurations in the design phases.

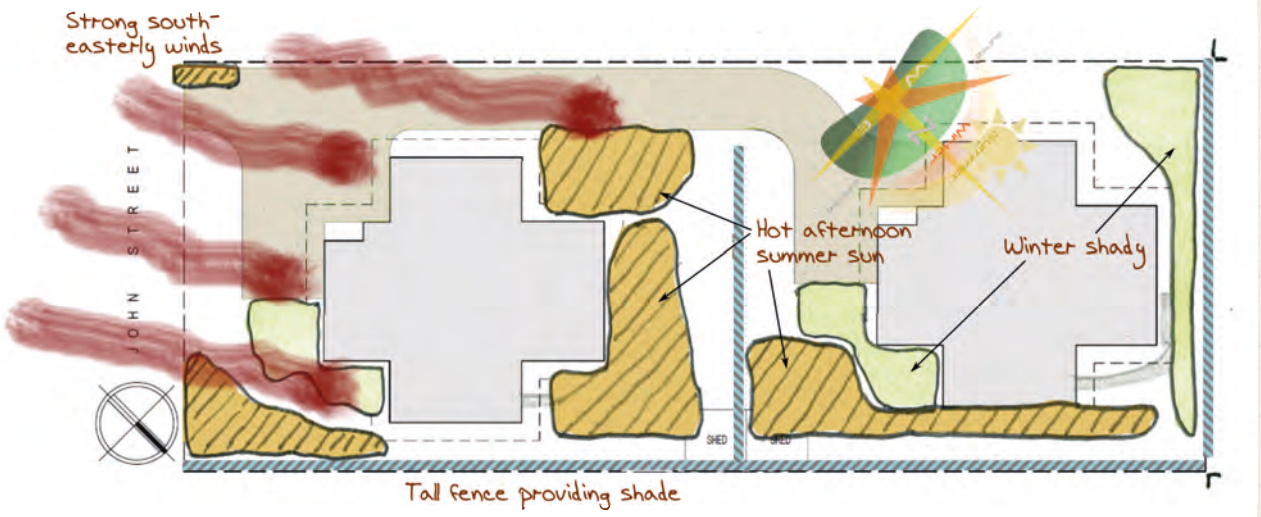
Mapping the existing vegetation and wildlife on our sites was easy as there was very little vegetation remaining after the construction work.

Theme: Microclimates

Microclimates occur in small areas where a set of climatic factors cause the area to develop a character of its own. They are created by small-scale differences in exposure to wind, direction of the slope (north and west facing generally being the hottest and driest), exposure to the sun, daily and annual patterns of sun and shade, etc. Microclimates might be small, but they give the observant designer a big head start on the journey to a self-sustaining landscape.

For example, we might look at a site and get the general idea that it is a barren, sun blasted, parking lot. The idea of planting thirsty, shade-loving turmeric would seem

Site survey: Microclimates



Site characteristics

Wind: very exposed to prevailing south-easterlies .

Strong gusty winds Some shade provided by houses and eaves NE side. Wind gusts around buildings.

Sun/Shade: Large areas hot afternoon sun in the summer.

Most shaded garden area on site to south of decks.

Fence on W boundary is high and provides some winter shading

Fence on NE boundary is high and provides some shading in early mornings.

Some shade provided by houses and eaves E side.

Water: Less rainwater under eaves. SE walls collect rain in wind. All roofs with guttering.

Summary

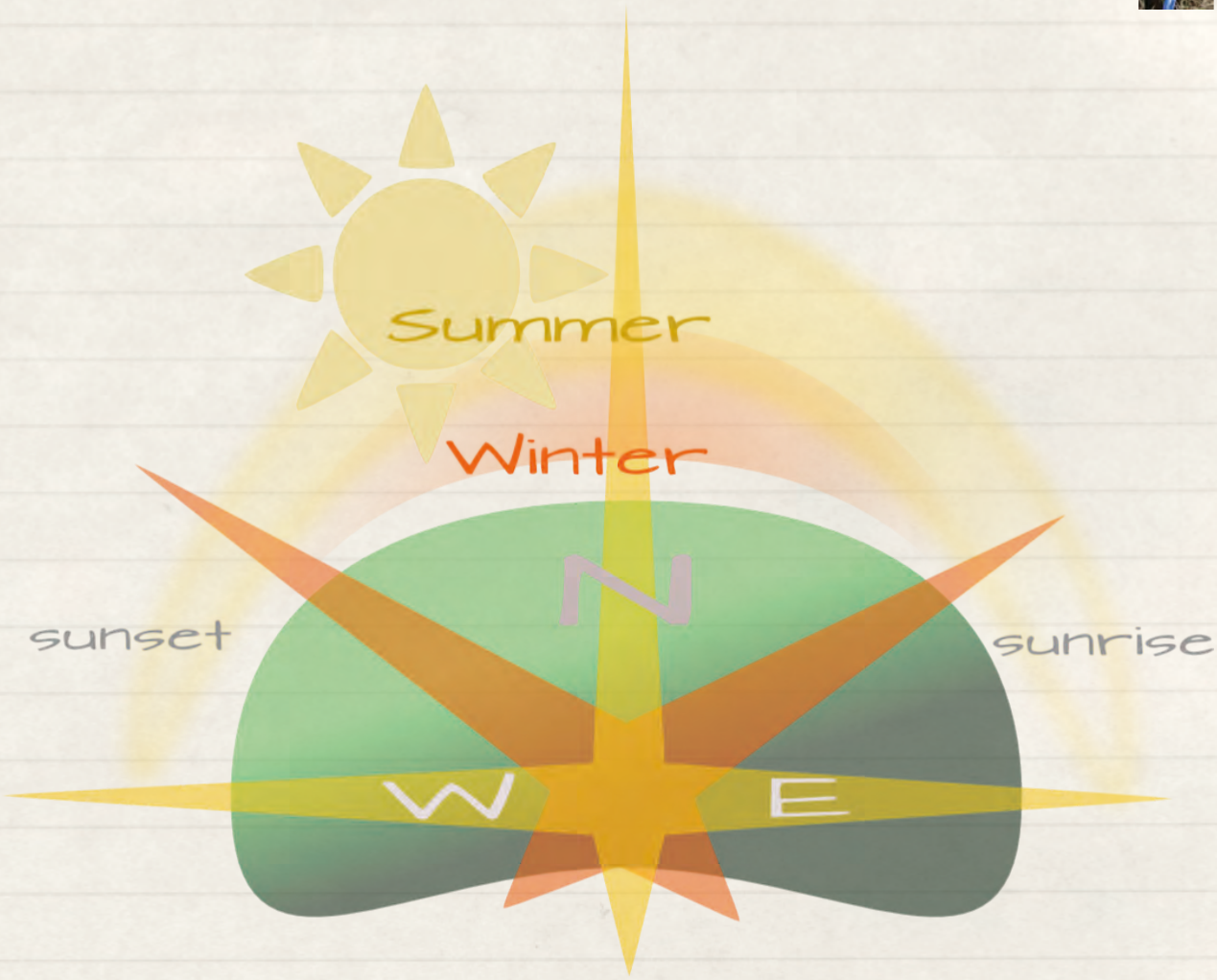
This is a windy site with some garden areas exposed to hot sun in the afternoons.

Potential design solutions

Will require wind tolerant vegetation

SE boundary with road and for residents sitting on the decks

Drought tolerant plants needed under eaves



doomed at first glance. But when we look more closely, there's a sheltered corner of the house, on the southern side, along the dripline of the eaves. That's a microclimate where turmeric might take off and yield a delicious crop. Once you develop an eye for them, the different microclimates on each site will jump out and reveal their opportunities.

The sun diagram above can be copied and cut out. You can use it to look at sun and shade patterns on the site. Keep the north arrow aligned with the compass symbol on your site plan. By moving the diagram around, the summer and winter sun arcs will show what areas of the site will get more shade and which are exposed to the hot afternoon sun. Remember that you can create shade in your edible landscape by selecting taller tree species and locating them to the north/west of where you need the shade.

Mapping the microclimates on the site is essential for selecting and locating appropriate plants. Understanding the patterns of microclimate on the site will also help determine the best location for landscape features like washing lines, wind breaks, sitting spots and play areas.

What to plant where?

The **Edible and Functional Plant Tables** (pp 76-81) show the microclimate preferences for each of the listed plants. Later in this process we will show you how to use these table to select plants that will grow best in the different microclimates on the site you're working with.

Theme: Access and circulation

Where are the existing roads and paths on the site? Look at and map how people are driving and walking through and around the site now. Try to identify spaces where activity is concentrated: these can be mapped as activity or service "nodes". If the site is currently vacant, think about how people are likely to use the site. Typical routes would be access to and from parking areas, the closest outside doors to the kitchen and laundry are always popular, and even water taps can be a traffic draw.

When we start designing we want to look at how we can create features and encourage people out into the garden by creatively using the paths and activity nodes.

Theme: Zones of use

Defining zones of use is a simple permaculture strategy for helping reduce the time and energy we need to spend gardening. Zone 1 is used to locate the activities we do most frequently, so this zone should be close to the house or along walkways that are in daily use. Veggies we pick daily would be close to the kitchen in Zone 1 for example. Whereas fruit trees harvested seasonally further away in Zone 2 or Zone 3. You can have up to five zones. Permaculture designs on rural properties will code the space and activities for all five zones, but in urban gardens two or three zones would be appropriate.

If the site you are assessing already has a garden, map the zones based on current activity patterns. Show which areas are being used most frequently.

In the John St case-study there were no residents so we looked at the existing infrastructure on the site, like the washing line and garden taps, the location of the kitchen, and building entrances to help us predict future activity patterns.

The John St units had very small gardens, so we felt just Zone 1 and Zone 2 would be appropriate to help us locate food plants according to how frequently they would be harvested and needed maintenance.

Existing features like concrete walkways and fixed structures can dictate how the site is to be used.

In the example pictured, it is quite clear where the shed access routes are going to be.

Aesthetics

This is the theme where you can stand back and look at the overall aesthetics of the site.

Where are the nice views that would be worth keeping? Are there ugly views or noisy roads you could reduce by dense plantings.

What feelings do you have about the site, what makes it special?

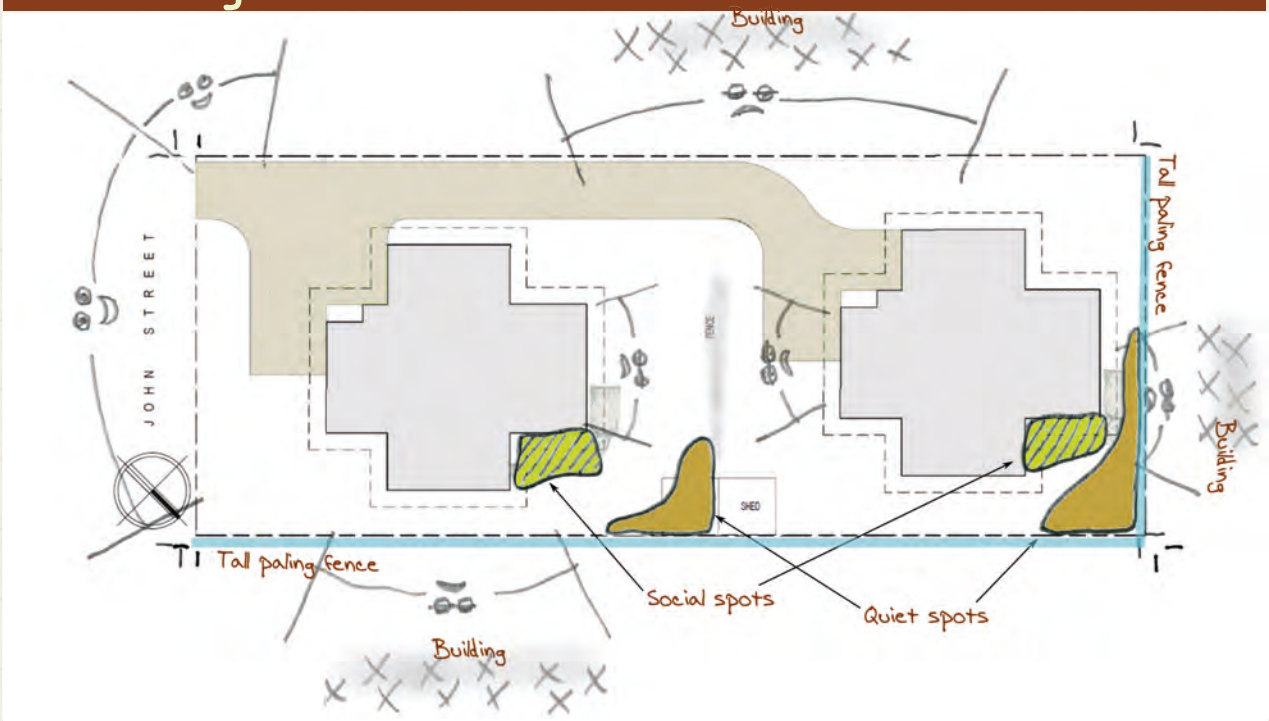
Other things to consider.....

In this step we look at all other non-map information we need to think about for our edible landscape design.

Quizzing the neighbours and housing providers

Now is a good time to check with the housing providers, tenants and neighbours to see if there are any particular challenges with the site that your mapping may have missed.

Site survey: Aesthetics



Site characteristics

Views:

- E corner provides great views over John St oval
- W view onto Small tree in neighbours garden & close proximity of fence creates cosy environment out of view & out of the wind.
- Poor views looking out onto neighbouring houses and between the units (kitchen to bedrooms)
- Quiet corners close to paling dividing fence and N fence line with neighbour. Other boundaries with open fences.

Potential design solutions:

- Screen out poor views to create privacy and reduce noise.. Design to promote the quiet corners
- How to reduce wind and keep distant views?

We've used happy/sad symbols to help remind us of the aesthetics at John St.

Are there problems with neighbouring dogs and cats, or horses, wallabies and bandicoots eating everything? Does the site flood? What previous land uses may affect your goals, and so on.

Reducing existing maintenance issues

Talk to the housing providers and the tenants about each of the properties you will be landscaping to see what maintenance issues they have. Also have a close look at your site to see if there are any existing or potential maintenance issues being caused by vegetation to housing and garden infrastructure. These are some of the common garden maintenance issues that good landscaping designs can reduce:

- mowing,
- leaf, palm frond and rubbish removal,
- tree lopping and removal (oversized, diseased, dangerous and weed trees),
- tree saplings growing next to houses
- vine removal from fences,
- weed management,
- wind damage from vegetation,
- gutter and roof cleaning and replacement
- water-logging
- dust
- tree roots

Try to quantify the costs of doing the maintenance and the associated expense of buying and servicing the necessary equipment.

Opportunities for passive cooling and heating

Think about how you can incorporate landscaping which will help cool buildings during the summer and warm them, if necessary, during the colder months. Landscaping can be used to reduce energy costs by passive cooling, for example by planting trees and shrubs to keep sun off the walls.

> *"You mean I won't have to buy a lawn mower and fuel? And mow every two weeks! "*
>
> *A new No-mower Food Grower, happy with their food growing ecosystem*

Adding value to existing on-site resources

Have a look to see what existing resources are on the site. There maybe old bricks or timber suitable for garden edging, or wire fencing for a vine trellises. Nature lets nothing go to waste, and she is our guide.

Consider neighbours and adjoining land uses

Many neighbourhood disputes can be over simple things like overhanging vegetation, vines damaging fences, and trees blocking views. Think about how you can avoid these issues and instead create opportunities for neighbourliness, like sharing overhanging fruit, helping to screen unsightly views, planting large community fruit trees in adjoining public spaces. Consider too how you could create 'natural' designs that look well-kept even when people have little time to tend to them.

Bananas and Passionfruit

Bananas and passionfruit are two fruits we have in abundance in our part of the world, and they are a match made in heaven. Both are easily grown at home or readily available from our suppliers of local produce.

Pan-seared Bananas with fresh Passionfruit

Per individual serve, simply slice two lady finger (or one Cavendish) bananas lengthways. Place a non-stick frypan on medium heat and when warm, add a very thin slice of butter, just enough to coat an area the size of the bananas. Heat the banana slices through for a few minutes on each side until slightly browned. Serve in a bowl with the flesh of 2 – 4 passionfruit drizzled over the top. If you don't have passionfruit, simply dust some cinnamon or nutmeg over the cooked bananas and serve with a drizzle of local honey and maybe some low-fat yoghurt.

Did you know?

Bananas have a whopping 467mg of potassium in each fruit and only 1mg of sodium. This helps to balance out the sodium potassium imbalance that most Australians have as a result of the amount of salt in food and the diet. This balancing of potassium helps to reduce high blood pressure and prevent heart disease.

Bananas also have:

- **antacid properties which helps to protect against stomach ulcers and acid reflux**
- **substances (protease inhibitors) that help to destroy bacteria in the stomach that can cause reflux and peptic ulcer symptoms**
- **substances (resistant starch and pectin) which together help the digestive system**
- **substances which support the good bacteria in the gut**

If slightly unripe (as lady fingers often are) they have a glycaemic index of only 30 which helps to prevent swinging blood sugars. All good for digestive and therefore immune health!

And to top it off, they are also a very good source of vitamin B6, C, manganese, magnesium and dietary fibre.

Summarising : one overlay to tell the story

Summarising your site assessment on one map is the last stage of this survey process. By looking at each theme carefully, you have picked up a lot more information than you started with. Now you can reflect on what were the most important features, opportunities, and constraints on the site.

Start with a new, blank overlay and build a summary map. Try to include at least one key thought from each theme. This is not an easy step, and it may take a few drafts to get a result that has the right feel. Dave Jacke offers this advice:

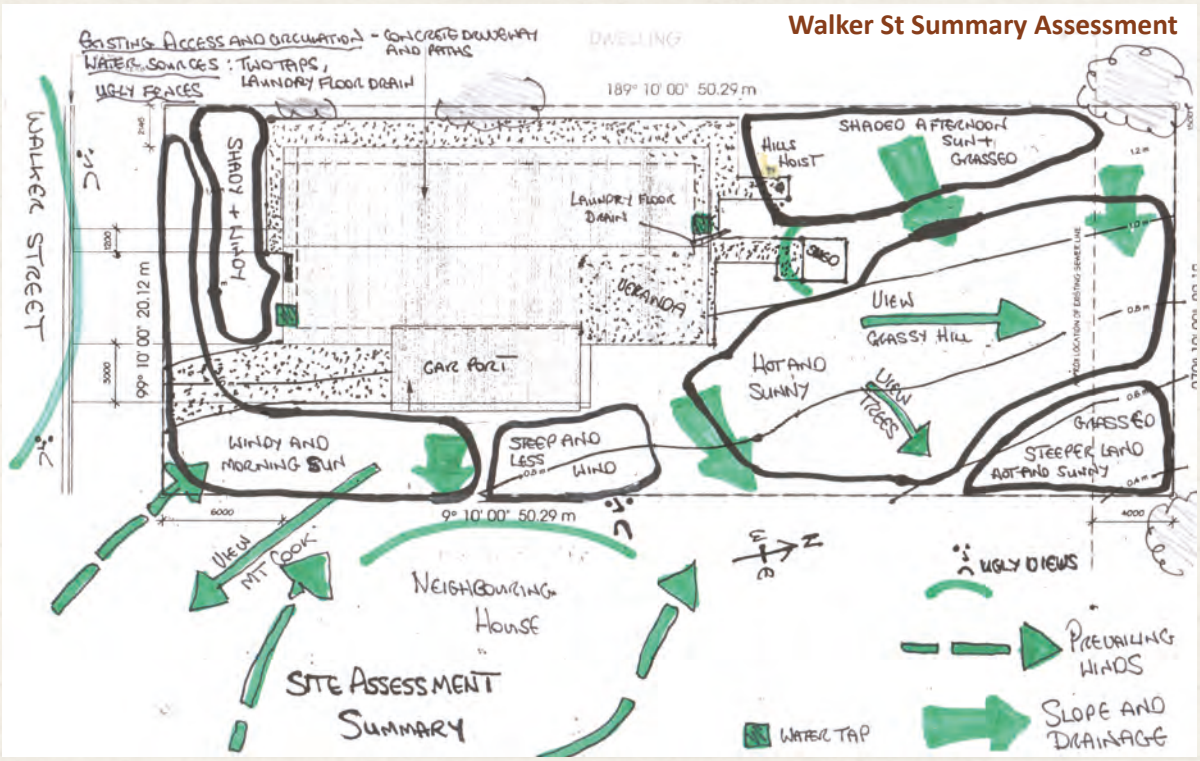
> *Ultimately, your summary drawing should help you see the big-picture patterns of the site, and it should give you a sense of one, two or three directions in which to head with your design as a whole. At the very least, it should illuminate quite clearly the key issues, problems, or challenges you face in your design, and it should give you a good background on how to resolve them, if not clear direction[1].*

There are many factors to consider while assessing your site, but careful observation is your gateway to working with nature and creating a successful, low maintenance layout for your edible landscape. A walk through any native bush brings home to us how finely-tuned natural systems are. Plant species change with each nuance in microclimate, different aspects, soil moisture, or even the shade of a large tree.

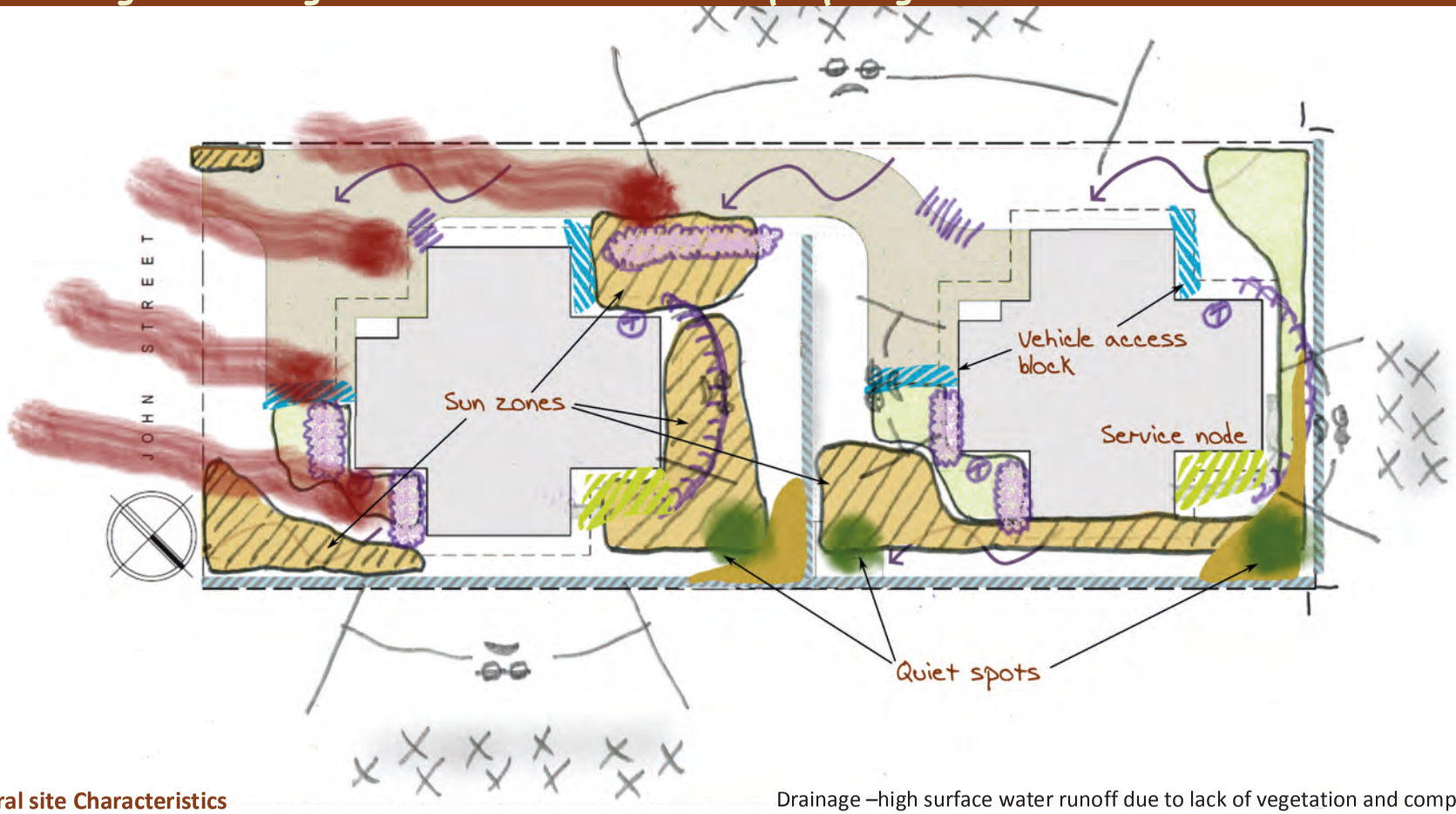
However detailed our site assessment, it is worth remembering that we have only gathered information equivalent to the tip of the iceberg, in comparison to the level of information natural systems are responding to about their environment. Having even this small tip puts us in a much better position than we'd be without it.

Well done: let's start designing!

[1] Edible Forest Gardens pg 227



Site survey: Summary Assessment for John St property



General site Characteristics

Site is very exposed to prevailing SE winds. Soils - mostly with little top soil, compacted clayey subsoil with imperfect drainage and very hard to dig when dry. Deep Granite soil classification?

Water – no storm or grey water from house. Rain shadows under eaves sheltered from the SE winds. Surface runoff

with few ponding & rainwater collection locations.

Drainage –high surface water runoff due to lack of vegetation and compacted soils. Berm stopping surface water under units.

Access and circulation – Existing food access around units to service nodes. Can use paths to create permanent berms.

Existing vegetation – no grass, only one tree – young coconut

Housing provider requested plantings or ? to prevent vehicles being driven off ends of concrete driveways

Cassava

Cassava is a good tropical replacement for potato that grows well in our climate. Like most starchy foods it's plain on its own. This is why it's a great food to serve with tasty flavours like stews, curries and herb and spice based dishes.

Consider planting cassava in your food garden. The important thing to know is that it will make you sick if you don't cook it well. When preparing cassava, look out for any blue, blue-green or black-ish colour in the white to cream flesh. If you see any, throw out the whole root. Blue to black colour indicates that the poisons that can develop in cassava have started, so it is no good to eat. If you watch out for these signs and cook it well you can safely eat it.

Cassava grows from stem cuttings. Chop ones that are thicker (2cm+ is best) and about 30cm long. Leave them to dry under shade for a week, then plant. Half the cutting length should be buried in the soil. Harvestable roots will be ready in 7-10 months. Harvest all the roots once the plant starts flowering, and save cuttings to replant the next crop. Once it sets seed, the roots become tough. Cassava likes regular water, but not too much, so plant away from any spots in the garden that get boggy in the wet season.

Always store cassava in the fridge as soon as you harvest or buy it. Light and heat trigger the roots to produce their poisons. When buying cassava, look at the broken or cut ends for signs of blue or black streaks and don't buy these roots.

Cassava has two skins – a rough brown outer skin, and a white or cream inner bark. Cut cassava into 10cm lengths then split in half. This makes peeling them easy. Grating cassava is a good way to use older roots which have gone tough. The flesh of younger roots goes wonderfully fluffy when cooked.

This recipe is packed with flavour and has converted people who haven't liked cassava before, so it's a safe way to introduce people to trying this great tropical root vegetable.

CASSAVA
tapioca, manihot
Manihot esculenta
Yellow and white types of sweet cassava are available. Avoid bitter types.

Height	2-3m	shrub
Width	3m	

Plant branch cuttings with 2 nodes exposed.
Maintain weed/grass free.

Sun Tolerance	Wind Tolerance	Min Water
full sun	moderate	bi-monthly

Drainage	Soil needs	Root depth
seasonal wet	poor	medium

Step 3: Designing an Edible Landscape

Designing edible landscapes that work with nature can be a life-long passion. With each new understanding comes a new layer of interesting complexity. Complex situations can take some effort to understand, but the path forward is easy enough: one step at a time.

We will simplify the process to get you started, provide logical steps to follow, and highlight some useful guidelines along the way.

In **Step One** we developed a **Goal Statement** that expresses what we want to achieve (our *aspirations*). In **Step Two** we developed a set of theme maps and then produced a **Summary Site Assessment** (our *realities*). In **Step Three** we will work back and forth between these two pieces of documentation several times.

Some of the specific questions you might ask include:

- How can the natural strengths of the site be used creatively?
- What landscape features can be implemented on this site?
- How can existing maintenance issues be resolved or reduced?
- How can we use the existing infrastructure like stormwater runoff and greywater and the drainage patterns on the site to our advantage?

Having these questions in the front of our mind is quite helpful as we need to check a few times on both the Goal Statement and the Site Assessment to make sure our site design is staying within the frame of the desirable and the possible.

The key to making it work is to stick with the process. Spending time now creating a good design will make it easier to achieve your goals, and avoid the costs of maintaining poorly designed landscaping.

Chewy Cassava & Corn Curry Slice

- **700g finely grated cassava (2 med or 1 large root)**
- **3 eggs**
- **400ml (one can) reduced fat coconut milk**
- **2 teaspoons curry powder**
- **1 teaspoon sweet paprika**
- **1 teaspoon salt**
- **2 cups corn kernels**
- **1 lightly packed cup (80g) grated low fat tasty cheese**

Preheat oven to 190°C. Wash then peel cassava, and cut into smaller sections. Grate on fine blade of food processor grater blade, or on fine side of a hand grater. Take a handful at a time and squeeze firmly over the sink to get rid of as much juice as possible. Place squeezed cassava into a mixing bowl.

Mix eggs, coconut milk, curry powder, paprika and salt together well. Pour into cassava and combine well, then add the corn kernels. Mix again until well combined.

Pour mixture into a medium sized non-stick cake tin and bake for 60 minutes or until top is golden and looking crunchy. Remove from oven, sprinkle over cheese, and return to oven for 10 – 15 minutes or until cheese is golden. Good for lunch with a salad, or for dinner with some fresh grilled fish and a salad or steam vegies.

Ready for the challenge? Here we go…

Picking the patches: creating a landscape layout

Get several copies of your site plan or tracing paper, turn on some music and free yourself up to have a play.

Sit with the Site plan and let its dimensions and character come into focus. Draw rough outlines for the different landscaping and features planned for the site.

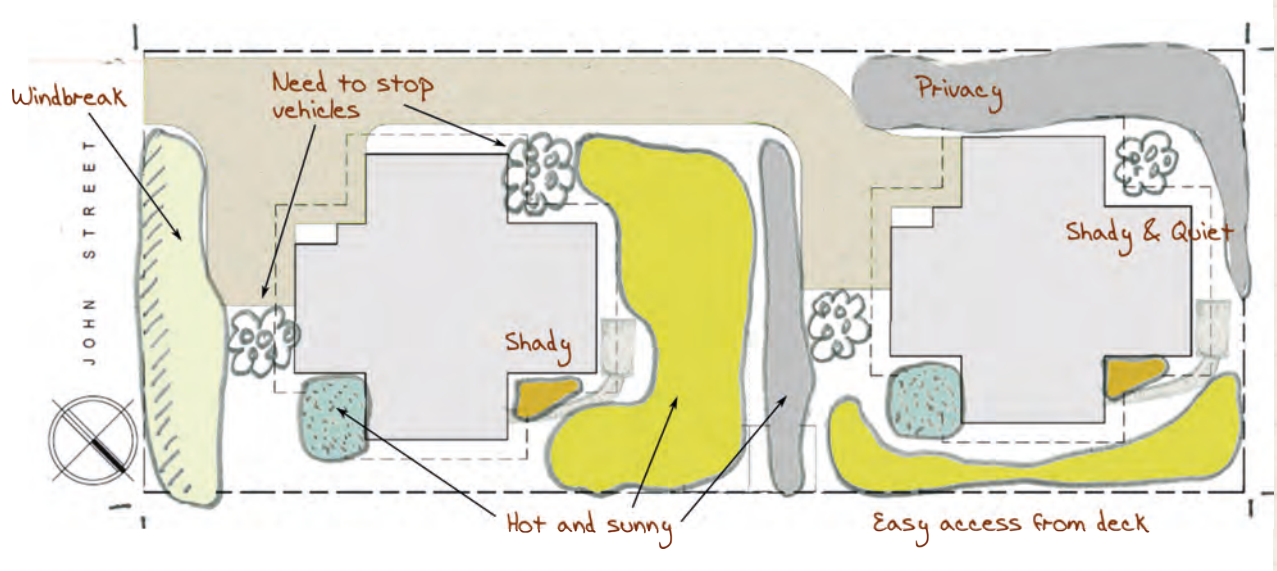
You may be working on a site where there is existing landscaping, or where the location of some features are pre-determined (eg, where there are fixed garden beds, etc), or you may be working in a big open backyard with no pre-existing features.

A key technique here is to keep this process quick, approximate, and playful. Use thick pens. Experiment with different layouts, considering the benefits and drawbacks of each variation.

Doing this sort of brainstorming on paper is much easier and cheaper than jumping in and running with a detailed layout too soon. Once you buy plants and start putting them in the ground, there's not much chance to improve the design plan.

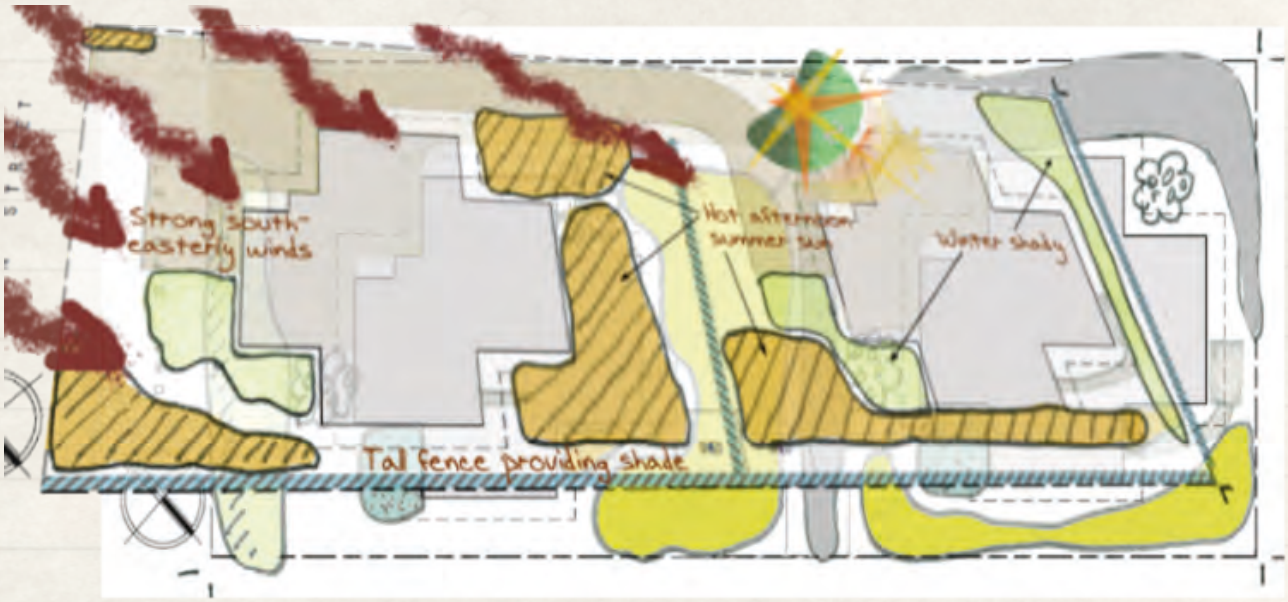
The outlines for landscaping areas and features are what we call "patches". Patches are used to identify areas with similar environmental conditions and uses.

Naturally, these "patches" are connected to the whole site in a functional sense. However, defining patches is a key process for this Guide as it will help us limit the number of variables and considerations that have to be accounted for. Patches are important.



This is our first attempt to map out the key landscaping patches on the John St site. We wanted to provide some wind reduction, a bit of privacy, cover the site with a food growing ecosystems, and provide nice places to sit outside.

Study the diagram and see if you can pick out the design choices. How well do our first-draft patches match up against the Goal Statement for the project?



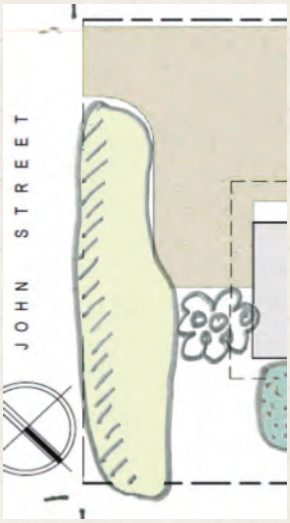
Check the environmental conditions in your patches

Now bring out your Summary Site Assessment and look at it with the rough draft patch plans as overlays.

For each patch, note the key environmental characteristics. This process will show how well your proposed locations for patches and landscaping features suit the environment and microclimate conditions on different parts of the site, and thus how effective the patches will be in achieving the purpose we have identified for them.

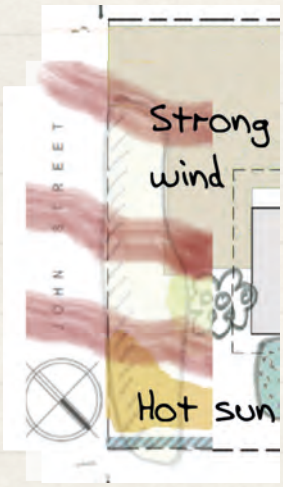
This is a process of experimentation: the point is to identify issues and look for natural solutions.

Here's an example of what we found with the large windbreak patch at the front of John St:



Our proposed patch:

Then we used the overlay process to compare this patch with on-ground conditions.



The eastern section of our windbreak was very exposed to the sun:

So we decided to split this area into two distinct patches. They will both need to serve the function of wind reduction, but in one patch will need sun hardy plant species.

Here's the revised patch plan:

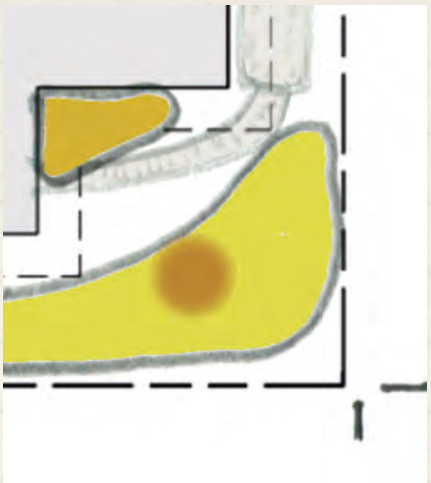
This patch arrangement recognises the distinct microclimate differences. In the end, however, we realised that there wasn't enough room on the ground to justify the two patches.

We ended up leaving it as one patch and made a note to plant more sun hardy species in the eastern section..

Windbreak patch in late afternoon, looking north east. The prevailing winds whip off the road and through the wire fence.

Check the features

This step also gives you a chance to check if your proposed landscape features, like paths and hills hoist are well placed. In our first patch plan we had placed a large, shady sitting area in the back of Unit 2.



However, our site assessment showed this area to be in full sun for most of the day. We also discovered by measuring out the patch and space needed for a table etc, that the actual dimensions of the space did not suit this. So we again needed to adjust our design layout to accommodate the realities of the site.

That's the idea. Look at each patch and feature and repeat this level of analysis until you've got a satisfactory design that is informed by both the Goal Statement (desired features and benefits: aspirations) as well as the Summary Assessment (environmental and infrastructure factors: realities).

Through the patch-work process outlined above, you will start to create patterns in the landscape, working with nature. Just like the different patterns of vegetation you see walking through native bush where the plant communities change with changing microclimate, drainage and other environmental conditions. Playing with designs will also help you imagine other possibilities and to identify potential planning issues.

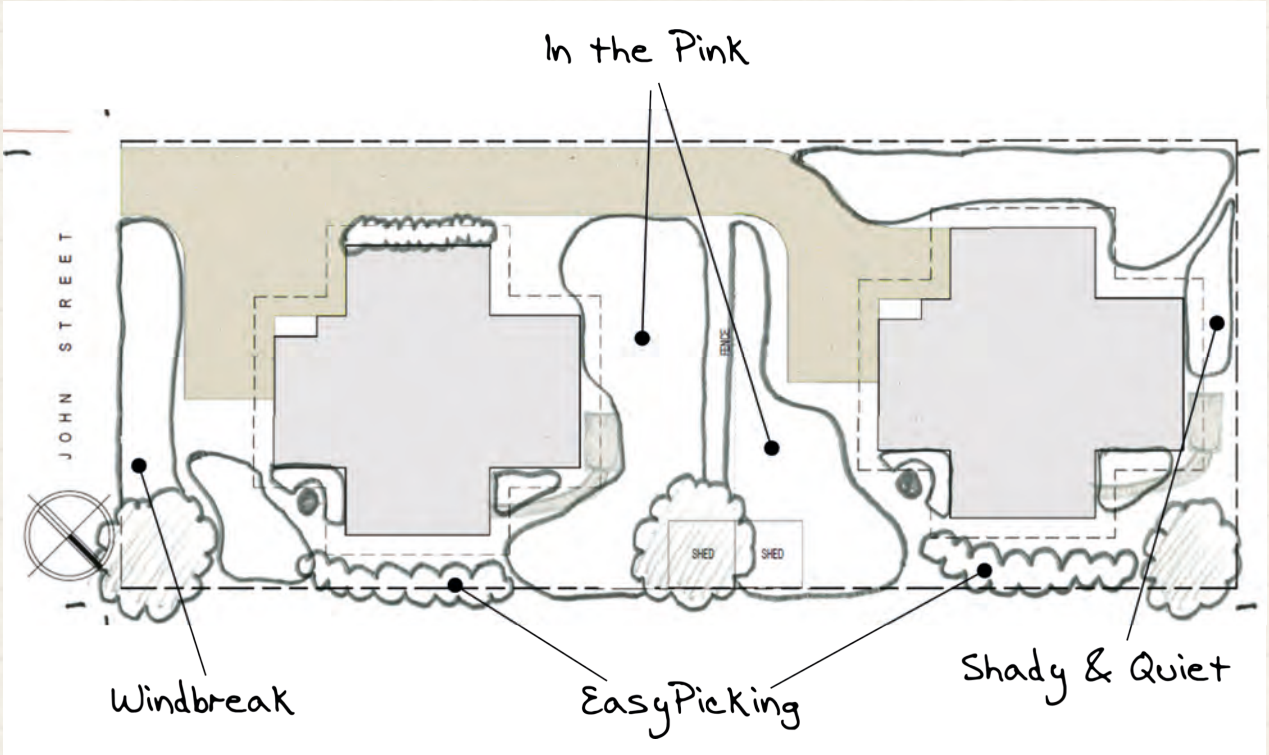
With your collection of patches, you are now ready finalise the layout for the landscape design. This is where you bring together the best and most appropriate ideas from all the rough drawings to create a final patch layout for the site.

As you sketch them in, give each of your patches a memorable name. We came up with: Windbreak; Shady and Quiet; EasyPicking; In the Pink. Have fun and be creative!

Describing the patches

Get a big sheet of paper or start a spreadsheet where you can write things down. For each patch, note the following:

- the benefit it contributes towards the Goal Statement (eg. windbreak, food);
- any special landscaping requirements (materials, equipment etc);
- any ongoing maintenance requirements;
- significant environmental conditions; and



Selection of patches for John St case study. The final design incorporates more detail.

- any special architecture goals for the patch (eg, if it has to provide shade, then the description for the patch could be "tall, dense, shade-producing"...this will be important information in designing the plantings).

To help you choose suitable species to plant in your different patches (Step 4), for each patch, make note of the environmental conditions using these categories:

- Sun and Shade: **full sun**, **part shade**, **full shade**
- Wind exposure: **strong** winds, **moderate** winds, **light** winds
- Soil drainage: **good drainage**, **seasonally impeded**, **always wet**
- Soil quality: **good** soil, **tolerable** soil, **poor** soil
- Soil depth: deep soil (over 1m), **medium** soils, **shallow** soils (10cm)

Go through each patch asking the same questions and noting down the terms.

Once complete, your the spreadsheet should look something like the sample to the right.

Okay, that's it. You have now completed your detailed layout for your landscape design. That's a huge step forward in the design process.

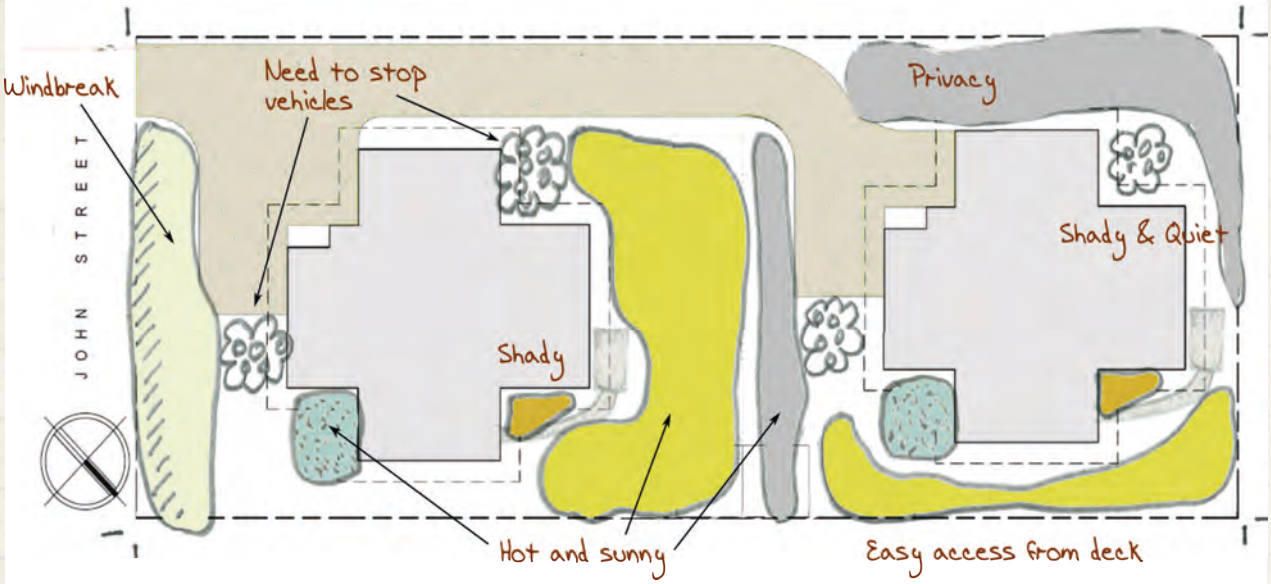
To summarise, you have:

- analysed the landscape as a whole, integrated system.
- identified patches within your landscape and cross checked them against both the Goal Statement and Summary Site Assessment to produce patches with well-defined environmental conditions and purpose.
- given each patch a name, summarised its environmental conditions, and provided sufficient descriptive detail to now move on and select plants for each of the patches.

Next step: selecting plants to put in patches.

Patch name	Contribution to Goal Statement	Special landscaping requirements	Special maintenance requirements	Architecture	Sun and Shade	Wind exposure	Soil drainage	Soil quality	Soil depth
In the pink (a)	Food	No vegetation overhanging or brushing against building		Ground covers, shrubs, and small trees	Full sun	Moderate winds	Seasonally impeded drainage	Poor soil	Medium
Easy picking	Food, Privacy	Vegetation with sufficient height to screen deck from neighbours. Pawpaws easy picking from veranda.	Remove suckers coming up next to fence.	Ground covers, shrubs, and small trees	Full sun	Moderate winds	Seasonally impeded drainage	Poor soil	Medium
Windbreak	Food, Windbreak	Plant more sun hardy species at eastern end. No large canopied trees because of powerline overhead		Ground covers, shrubs, small and large trees	Full sun	Strong winds	Seasonally impeded drainage	Poor soil	Medium
Shady and quiet	Food, Peace and quiet			Ground covers, shrubs, with small trees	Full sun	Strong winds	Seasonally impeded drainage	Poor soil	Medium

Detailed design: John St



Windbreak

Purpose – food & wind break

Conditions –exposed, poor soil with impeded drainage subsoil

Architecture – tall nearest fence, not wide canopies because of power lines.

Density & layers sufficient to reduce but not stop winds

4 layers vegetation

12m long 2.8 -3.5m wide

Veggies and herbs

Herbs and perennial veggies.

South of deck most shady part of garden and close to water tap – put outside sink and use grey water?

North of deck protected afternoon sun

Easy picking

Bananas & Paw paws between deck and fence – Privacy and food

(Unit 1: 1.6x 7m) (Unit 2: 2.4x7m)

Maintenance - keeping banana suckers away from concrete fence footings

Trellis with passion fruit vines

Shady and quiet

Food and quiet spot

2.5x 10m approx

Tall fence and unit creates shade

Shade loving plants

Small trees 3 layers

Could have larger tree north corner

In the Pink

Uses – food, attractive, bird and butterflies

(b) Also passive cooling bedrooms

(c) Also privacy and windbreak

Conditions –hot afternoon sun

Architecture –smaller trees near houses 3-4 layers

(a) Approx 4 x 4m

(b) Approx 12 x 6 m

(c) Approx 12 x 2.8-5

Privacy

Purpose –food, privacy

Conditions – sheltered from afternoon sun, poor soil

Architecture – tall nearest fence.

4 layers plants. Use water ponding areas for plants needing more water

Keep plants away from fence Approx 13m x 3-4m

Between fence and driveway - densely planted and reduce potential of vines growing up fence - Arrowroot?

Tough stuff

Hardy species needed between carport and drive for sun and feet

Large trees

with dense shade and understorey veg

Additional notes

Paths in rain shadows around house servicing water taps & gas tanks

Path veranda to clothes dryer built 0.8m wide

New paths 0.6m

Oval gardening node

Paths permanent border for 'Fresh herbs and veggies' beds

Raise path around NW side to create berm

Dashed path 0.3m wide or stepping stones meander through trees for harvesting

Barrier plants

End of driveways to prevent vehicle access to garden areas

Differences between edible landscaping in the tropics versus temperate environment?

Exploring the differences between edible landscaping in temperate verses tropical environments is a project in itself and research that needs doing to help us refine the design process for the tropics. However, we do know at this stage that we need to rapidly build soil organic material levels to establish our edible landscapes. This is because in tropical environments:

- **90% of the biomass is in the vegetation above ground and only 10% in the soil below ground. As the permaculturist Geoff Lawton states, this compares with temperate areas where the ratio is 40% above ground and 60% below and, by the way, where most of the gardening and horticultural techniques we use were developed;**
- **soil organisms work fast chewing organic materials, rapidly breaking down mulch into small particles which can be quickly washed out of the soil;**
- **weeds grow fast.**

What are the possible consequences for tropical edible landscapers? As permaculturists have found through their experiences in creating food forests in these climates, you need to get your plants growing as quickly as possible. For example in new gardens and existing grassed sites there obviously isn't much biomass in that above ground 90%. So it doesn't take much imagination to picture the small amount of biomass below ground. In these situations biomass accumulation is conventionally done by bringing in and spreading mulch to landscape the site and there after at regular intervals. In low maintenance edible landscapes mulch can be initially spread, but then it is grown on site from green manures, living ground covers, and planting fast growing layers of vegetation (vertical stacking) to contribute mulch from above. Legume ground covers, shrubs and trees are used in the planting mix. Geoff Lawton recommends that 90% of the initial plant biomass should be legumes. These landscapers aim to rapidly increase the 90% to increase the 10% in the soil, improving soil health, plant nutrient availability, soil water holding capacity, and consequently increasing plant growth.

We have included additional 'tropical' ecological functions to help you kick start your edible landscape: biomass accumulators, fast growing vegetation, shade producing trees and shrubs and weed suppressors. Shade producing trees and shrubs will help soften the climate on your site, protecting your plants from harsh, dry conditions.

Re-establishing the prairies as food growing ecosystems

Although it's a world away from the tropics, the **Land Institute** in the United States is undertaking innovative research re-establishing the prairies as food growing ecosystems demonstrating that these edible landscapes can be created from all sorts of vegetation types.

They are exploring ways to grow mixed perennial plantings of grains, oilseeds and legumes together so they interact in complementary ways to manage both pathogens and pests naturally, all while providing food for years without replanting. They say that in many situations, the deep roots of perennial grains better withstand the drought or deluge likely to accompany climate change, they sequester carbon and host microorganisms and invertebrates that contribute to soil health.

Check out their website for more information: www.landinstitute.org

Step 4: Plants for patches

In this step we will walk through a process to select food plants and plants providing ecological functions.

Picking a plant palette

Have you ever wondered: How many plants could Peter Piper pick if he picked a proper planting palette? Well, let's try to answer that question.

For this process you could benefit from creating a spreadsheet, though paper will work fine if you're patient and write neatly.

We're working with the list of Patches from Step 3, plus the **Edible Plant Tables** located at the back of the Guide. The Edible Plant Table is a list of species that are especially well- adapted to our climate and soils. We suggest you use this list as the starting point for species selection.

You may also have a list of favourite food plants in mind, and you'd like to place them in the veggie garden, food growing ecosystem, or for the other edible landscape features on your site. The process following will help check if these plants will grow well in the environmental conditions found in each of your patches.

The environmental conditions of each of patch are the key to selecting suitable plants. Use the environmental characteristics you have listed for each of your patches to identify and compile a list of plants that will grow well in these conditions.

Example: this is a snippet from our John St case study showing the five environmental conditions we noted for the patch, *In the Pink (a)*

Patch name	Contribution to Goal Statement	Special landscaping requirements	Special maintenance requirements	Architecture	Sun and Shade	Wind exposure	Soil drainage	Soil quality	Soil depth
In the pink (a)	Food	No vegetation overhanging or brushing against building		Ground covers, shrubs, and small trees	Full sun	Moderate winds	Seasonally impeded drainage	Poor soil	Medium
Easy picking	Food, Privacy	Vegetation with sufficient height to screen deck from neighbours. Pawpaws easy picking from veranda.	Remove suckers coming up next to fence.	Ground covers, shrubs, and small trees	Full sun	Moderate winds	Seasonally impeded drainage	Poor soil	Medium
Windbreak	Food, Windbreak	Plant more sun hardy species at eastern end. No large canopied trees because of powerline overhead		Ground covers, shrubs, small and large trees	Full sun	Strong winds	Seasonally impeded drainage	Poor soil	Medium

For each patch, we scan through the Edible Plant Table and look for exact (or close) matches to the environmental conditions.

Common name	Species Name	Height	Width	Lifecycle	Time to Harvest	Succession	Sun and Shade	Wind tolerance	Minimum watering	Drainage tolerance	Soil quality required	Soil depth required
acerola	*Malpighia emarginata*	2m	2m	perennial	2y	middle	part shade	delicate	bi-monthly	seasonal wet	poor	deep
albika	*Abelmoschus manihot*	2m	2m	perennial	1y	middle	part shade	delicate	weekly	seasonal wet	tolerant	medium
amaranth	*Amaranthus spp.*	50cm	40	annual	2m	early	sun and shade	delicate	weekly	seasonal wet	tolerant	medium
arrowroot	*Maranta arundinacea*	50-75cm		spring	1y	early	part shade	delicate	weekly	seasonal wet	tolerant	medium
banana	*Musa spp.*	2-3m	2	perennial	10m	early	full sun	delicate	monthly	must drain	tolerant	medium
basil	*Ocimum basilicum*	1m	500	self-seeding	3m	early	part shade	delicate	weekly	seasonal wet	rich	shallow
beach almond	*Terminalia catappa*	4-6m	4-6m	perennial	2y	mid late	full sun	hardy	bi-monthly	must drain	poor	deep
beach cherry	*Eugenia reinwardtiana*	2m	2m	perennial	2y	middle	full sun	delicate	monthly	must drain	tolerant	medium
Brazilian spinach	*Alternanthera sissoo*	50cm		perennial	3m	early	part shade	moderate	monthly	seasonal wet	tolerant	shallow
bullock's heart custard apple	*Annona reticulata*	3-4m	3	perennial	3y	early	full sun	delicate	monthly	must drain	rich	deep
carambola	*Averrhoa carambola*	4m	4	perennial	2y	middle	full sun	delicate	monthly	seasonal wet	poor	deep
cassava	*Manihot esculenta*	2-3m	3	annual	8m	early	full sun	moderate	bi-monthly	seasonal wet	poor	medium
Ceylon spinach	*Basella alba*			annual	3m	early	part shade	delicate	weekly	seasonal wet	rich	medium
cherry tomato	*S. lycopersicum var. cerasiforme*	60cm	500	self-seeding	3m	early	full sun	delicate	bi-monthly	must drain	tolerant	shallow
chilli	*Capsicum frutescens*	1-2m	1m	self-seeding	6m	early	part shade	moderate	monthly	must drain	tolerant	medium
chives	*Allium schoenoprasum*	30cm	3cm	clumping	5m	early	sun and shade	moderate	weekly	seasonal wet	rich	shallow
coconut	*Cocos nucifera*	5-25m	4-6	perennial	4y	mid late	full sun	hardy	bi-monthly	seasonal wet	tolerant	deep
corn	*Zea mays*			annual	2m	early	full sun	moderate	weekly	seasonal wet	tolerant	medium

For example, our patch–*In the Pink B*–experiences full sun, moderate winds, and seasonally impeded drainage (seasonally wet), the soil is poor, and only moderately deep. So we scanned for species in the Edible Plant Table that preferred full sun, moderate winds, didn't mind poor soil, only moderately deep, and soil with impeded drainage. In the first instance select species that meet all of the environmental characteristics.

If you don't find enough species exactly matching your characteristics you can scan the plant list again looking for others that will 'tolerate' the patch conditions. You will need to decide which of the environmental characteristics you can be more flexible about.

For example we decided we would mound fruit tree planting sites, enabling us to add to our list some fruit trees which need deep soil. We also included species listed as 'tolerant' for soil quality.

We have only listed a few of the potential food species you could plant so you may also like to research information on other species (see 'Need some more' on p48).

As you go through your selection of food plants, see if they will also provide some of the other benefits you wanted from your patch. We have included information on some benefits in the table, for example whether the plants have beautiful flowers, are good wind break species, and provide shade. But you will need to research species for any other benefits you require.

Use this simple process to compile a list of suitable plants for each patch. You should end up with quite a few options. This is a "food species palette," as Dave Jacke describes it.

Following is an example food species palette for some of our patches at John St.

Easy picking	In the pink (a)	In the pink (b)	In the pink (c)	Privacy	Veggies and herbs (shady)	Veggies and herbs (sunny)	Windbreak	Shady and quiet
Pawpaws	Madarin	Cassava	Cassava	Cassava	Tumeric	Cherry tomato	Galangal	Ginger
passion fruit	Sweet orange	Madarin	Madarin	Bananas	perennial coriander	Chilli	lemon grass	Tumeric
Aibika	Tahitian lime	Sweet orange	Sweet orange	Aibika	brazilian spinach	Okinawa spinach	Mango (M)	Kaffar lime
Bananas	Lemon	Tahitian lime	Tahitian lime	Beach Cherry	shallots	shallots	coconut (ml)	Pomelo
ceylon spinach	sweet potato	Lemon	Lemon	Carambola	garlic chives	Basil	Lady apple (m)	Bananas
sweet potato	Bananas	sweet potato	sweet potato	Sapodilla	chives		Sweet tamarind	Aibika
Carambola	ceylon spinach	Bananas	Bananas	Acerola	Basil		Sugar cane	ceylon spinach
Acerola	sweet potato	Carambola	Tahitian lime	Orange Jessamine	Perennial leeks		ceylon spinach	sweet potato
Native Guava	Carambola	Acerola	Lemon	Tahitian Lime			sweet potato	Custard Apple
Beach cherry	Acerola	ceylon spinach	ceylon spinach	Native Guava				Sugar Apple
ceylon spinach	sweet potato	sweet potato	sweet potato	Mandarin				Pomelo
Mulberry	Mulberry	Mulberry	Mulberry	ceylon spinach				Native Guava
Macadamia	Macadamia	Macadamia	Macadamia	sweet potato				Beach Cherry
Custard Apple	Custard Apple	Custard Apple	Custard Apple	Mulberry				
Sugar Apple	Sugar Apple	Sugar Apple	Sugar Apple	Macadamia				
Pomelo	Pomelo	Pomelo	Pomelo	Custard Apple				
				Sugar Apple				
				Pomelo				

Missing your favourites?

You may be disappointed to find that some of the food plants you wanted to plant are not really suitable to the environmental conditions in any of your patches. If you are still keen to grow them, that's ok, but they may need more tender loving care and made more comfortable on planting.

Filling out the palette: Adding ecological functions

In this step we work on getting the necessary ecosystem functions up and running. Refer to the Ecological Functions table on the next page for guidance.

Go through your list of food plants:

- highlight any that provide any of the ecological functions listed in the table, and
- keep a tally of how many plants you have for each ecological function

How are you doing? Do you have sufficient plants in each of your patches to provide the recommended number of plants for each of the ecological functions?

If you do, you can skip the next step and go straight to 'Final arrangements: planning the perfect Patch'.

However, more than likely you won't have enough plants. To help we have provided another plant table at the back the Guide, but this time focusing on species that provide ecological functions.

Use the same process as you used to select the food plants, only this time you will select suitable plants from the Ecological Function Plant Table.

You are now entering the realm of permaculture.

We have some tools to help us create ecological functions, thanks to the work of ecological researchers delving into the complexity of natural systems and extracting gems of functional understanding. This understanding is an important step on the road to creating edible landscapes that function like natural ecosystems.

We use the functions Dave Jacke uses in *Edible Forest Gardening* and have added others we consider to be important in tropical environments. In the far right column we have provided guidance on the number of different species good to plant in each of your patches or landscape as a whole.

Building nitrogen in the soil	Accumulating nutrients	Biomass accumulator	Decompacting the soil	Provides shade	Fast growing	Biodiversity support	Weed suppression
cow peas	Stylo	Bananas	Green-leafed desmodium	Albiza lebbeck	cow peas	Orange Jessamine	sweet potatoes
pintos peanuts		sweet potatoes		Drumstick Tree	Bananas	Syzygium australe Resilience	cow peas
Stylo		cow peas			Pigeon pea		pintos peanuts
Albiza lebbeck				Mango	Albiza lebbeck		
Pigeon pea				Carambola	Drumstick Tree		
				Sugar Apple			
				Beach Cherry			
				Reslience			
				Pomelo			
				Macadamia			
				Native Guava			
				Custard Apple			

Sample of ecological function species selected for In the Pink.

Guidance on ecological functions

Ecological functions	How does it work	Guidelines
Building Nitrogen	Plants with nitrogen fixing bacteria in their roots. These bacteria collect nitrogen from the atmosphere making it available to the host plant and other plants when all or some of the host plant dies. Many of these plants are in the Pea family (N)	2-3 species in all patches
Biomass Accumulating Plants	These are plants that are excellent at creating bulk plant tissue. Bananas are a good example. They help the garden become self mulching and increase organic and carbon levels in the soil (BA)	2-3 species in all patches
Fast Growing Plants	Fast growing plants are useful helping you reduce weed issues, quickly build biomass and fast track succession (F).	2-3 species in all patches
Shade Producing Trees and Shrubs	These plants help change the microclimate on the site, particularly important on hot dry sites, helping soften the site and creating suitable conditions for late succession, shade loving plants the table distinguishes between plants providing light shade (LS) and heavy shade (HS).	All food growing ecosystem patches and otherwise where needed
Soil De-compactors	These are plants with deep roots that can help de-compact the soil (D)	Preferably more than one species in each patch
Weed Suppressors	These are plants that are particularly good at suppressing weeds. Many of them are ground covers, but we also include trees and shrubs creating dense shade, because shade reduces weeds as well.	2-3 species in all patches
Nutrient accumulators	Some plants are particularly good at mining nutrients from deep down in the soil, increasing the availability of these nutrients for themselves and other neighbouring plants. (NA)	Preferably more than one species in each patch
Plants Helping Increase Biodiversity	These include plants that provide: - food and shelter for beneficial birds or other vertebrates (W) - shelters for beneficial invertebrates - insects and other arthropods (IS) - nectar and/or pollen for beneficial insects. Most plants produce nectar, but these plants are particularly good because beneficial insects are attracted to their flowers and/or they flower over a long period (N)	Preferably one species in each patch

Don't put all your eggs in one basket

Plant at least 2-3 different varieties for each food plant, plus different species for each function.

Dave Jacke calls this "creating Ecological Redundancy," or in permie-speak "each important function is supported by many elements".

Mix of sweet potato and banana in Tonga.

Selecting the pick of the bunch

For each patch we now have a number of food species and plants providing ecological functions. Here we use some easy criteria to select the pick of the bunch from our plant list. Don't necessarily exclude the other species in your list as some of them may help you fine tune your planting design or to meet other criteria, and you may come back to them later.

For each patch go through your list of plants and, using different coloured pens, highlight your species using the criteria listed below. You will most likely end up with some species meeting more than one criteria and therefore highlighted two or more colours.

Multifunctional species

These are the species you have listed more than once in your plant list. If you had listed Sweet potatoes for example, you would have highlighted it as sweet potatoes provide food, suppress weeds and provide a living ground cover. All that from just one plant!

Goal-achieving species

These are species that particularly excel at helping you achieve the benefits you want from the patch. They may be well adapted to the patch environmental conditions, taste wonderful, or provide a beautiful overarching canopy of vegetation. For example in our 'In the Pink'

Need some more?

If you would like to include other food plants that are not listed on the Edible Plant Table, spend some time researching their requirements to see if they are suited to your site. We have only listed a fraction of the species you could possibly plant. What about local natives for example? You don't need to dig out books, although they can help. Plant labels at nurseries often have simple information about whether the plant will grow in full sun and what type of soil it prefers. Also ask your neighbours, members of local gardening and permaculture groups, and check out the web (see 'Getting more Information'). Can you help us build this database of species by adding and sharing information from your own experience and research?

patches we wanted food plants primarily and highlighted food plants that many of the housing tenants Cooktown, Wujal Wujal and Hopevale said they would particularly like to harvest from their garden.

However in the Wind Break patch we highlighted plants that were particularly suited to the windy site conditions.

Final arrangements: planning the perfect Patch

This is it: the last stage of planning! Creating your biodiversity.

Adding biodiversity is an important step in any edible landscape design. Food growing ecosystems are naturally bio-diverse, but other edible landscapes can also be better designed to incorporate biodiversity.

Even just mixing different fruit trees together rather than having single species rows has been shown to reduce pest damage.

Inter-planting and under-planting with species that provide ecological functions will help you grow healthier and more productive crops with less intervention.

For your veggie patch you could grow a mixture of different veggies together that benefit from their neighbours rather than compete. These guidelines can also help you choose your species mix for your green manures.

There are lots of factors to consider when designing what goes where in a patch. So don't juggle too many species at one time! Limit the number of species you use in each patch (Dave Jacke recommends only **3 – 7 species**/varieties).

This might also be a good time to get some help, especially if you know someone who is familiar with many of the plants you are proposing to use. The better you know the plants the more the design process becomes intuitive.

We have provided information that will help you in the plant tables: height, width, growth form, root patterns, life span (annual, biannual or perennial) and time to maturity. You can research this information for other species not listed, although it is often difficult to find information on root patterns.

Designing the canopy

Design your vegetation canopy first. This makes sense as what you choose to plant, and where you will plant it, influences the species that will grow well underneath.

Usually this is your tree layer, just like the tree canopy in a forest, but the design process can likewise be used for designing your herb garden or a single layered mixture of ground covers under your established bananas or orchard trees.

Go through the list of candidate species for each patch and highlight the plants that will form the canopy layer (trees or large plants like pawpaw and banana).

Experiment with different planting designs using overlays on tracing paper or computer graphics. Use your design layout, zooming in on patches if necessary to create large enough aerial views to illustrate the crowns of your trees.

Use circles with diameters representing the width of the tree at maturity. Lemon trees for example have an average width of 3m when mature, whereas mangos usually grow to 6m across.

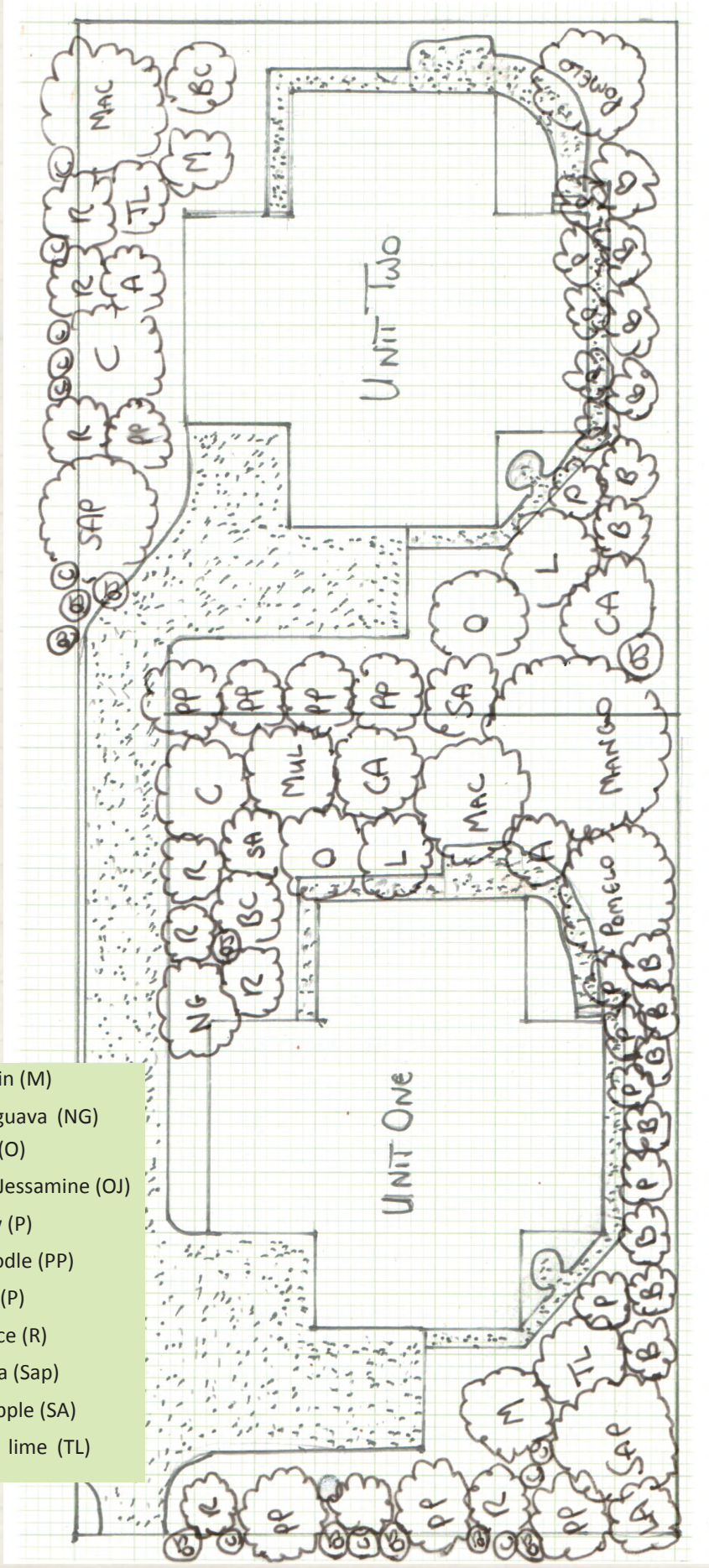
Check the width of your plants using the data in the Edible and Ecological Function Plant Tables, and the research you have done on other plants.

The overlays will help you to relax and experiment with different designs before drawing out your preferred planting design.

How dense a canopy?

You can space out your canopy trees depending on the desired architecture for your patches, the amount of open canopy, and changes in canopy cover you want.

If you are creating a food growing ecosystem, you may choose (for example) to imitate Open Woodland with generally only 40% tree canopy, whereas in rainforests it is about 90-100%.



Species index

Acerola (A)
Banana (B)
Beach Cherry (BC)
Black Mulberry (M)
Carambola (C)
Custard Apple (CA)
Dwarf coconut (C)
Lady Apple (LA)
Lemon (L)
Macadamia (Mac)
Mandarin (M)
Native guava (NG)
Orange (O)
Orange Jessamine (OJ)
Pawpaw (P)
Pink Poodle (PP)
Pomelo (P)
Resilience (R)
Sapodilla (Sap)
Sugar Apple (SA)
Tahitian lime (TL)

If you are planting in the wet dry tropics or wet sub tropics and tropics we would suggest following the experiences of permaculture food forest practitioners, like Geoff Lawton, and design your plantings to get canopy cover as quickly as possible.

Space your main food trees for their canopies to be touching when mature, and inter-plant with fast-growing short-lived legume trees.

You will then quickly change your microclimate, build biomass and shade out weeds. If you time it nicely your fast growing trees will die back when your food plants are maturing. Otherwise they can be pruned back to promote the growth of your food trees and the branches and leaves dropped as mulch.

Don't plant your food plants at too high density or they will just compete. Space out your plants to give each of them enough physical room to grow both above and below ground (check root structure).

Look also at how much shade your canopy trees will create. Many fruit trees produce better with no overhead canopy or just with a light shade canopy tree overhead.

As Dave Jacke says "compatible plants grow in different physical spaces with different forms, heights, rooting patterns, and so on". This guidance also holds for your understory plants.

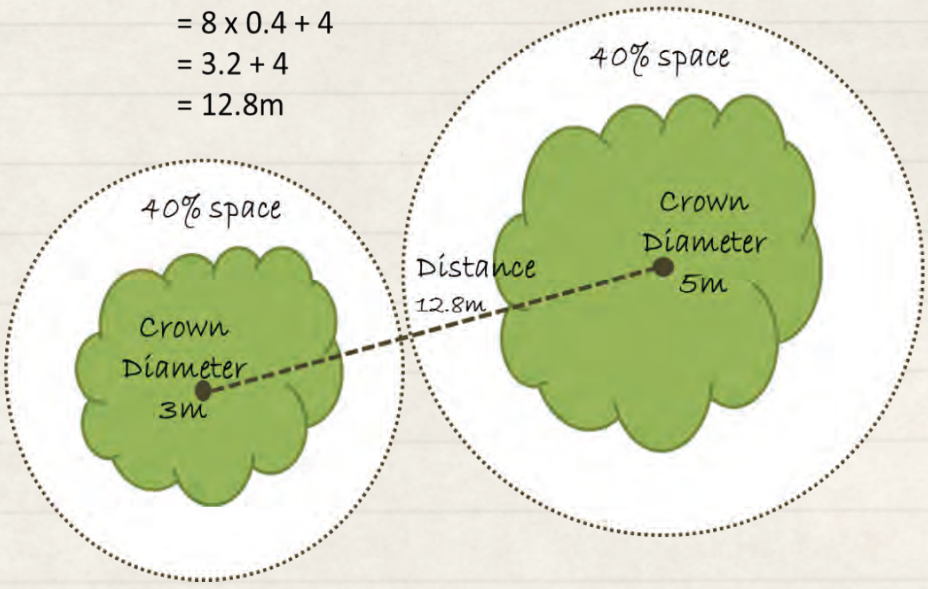
We have provided a method below for how you can work out the spacings for your trees based on the canopy cover you want.

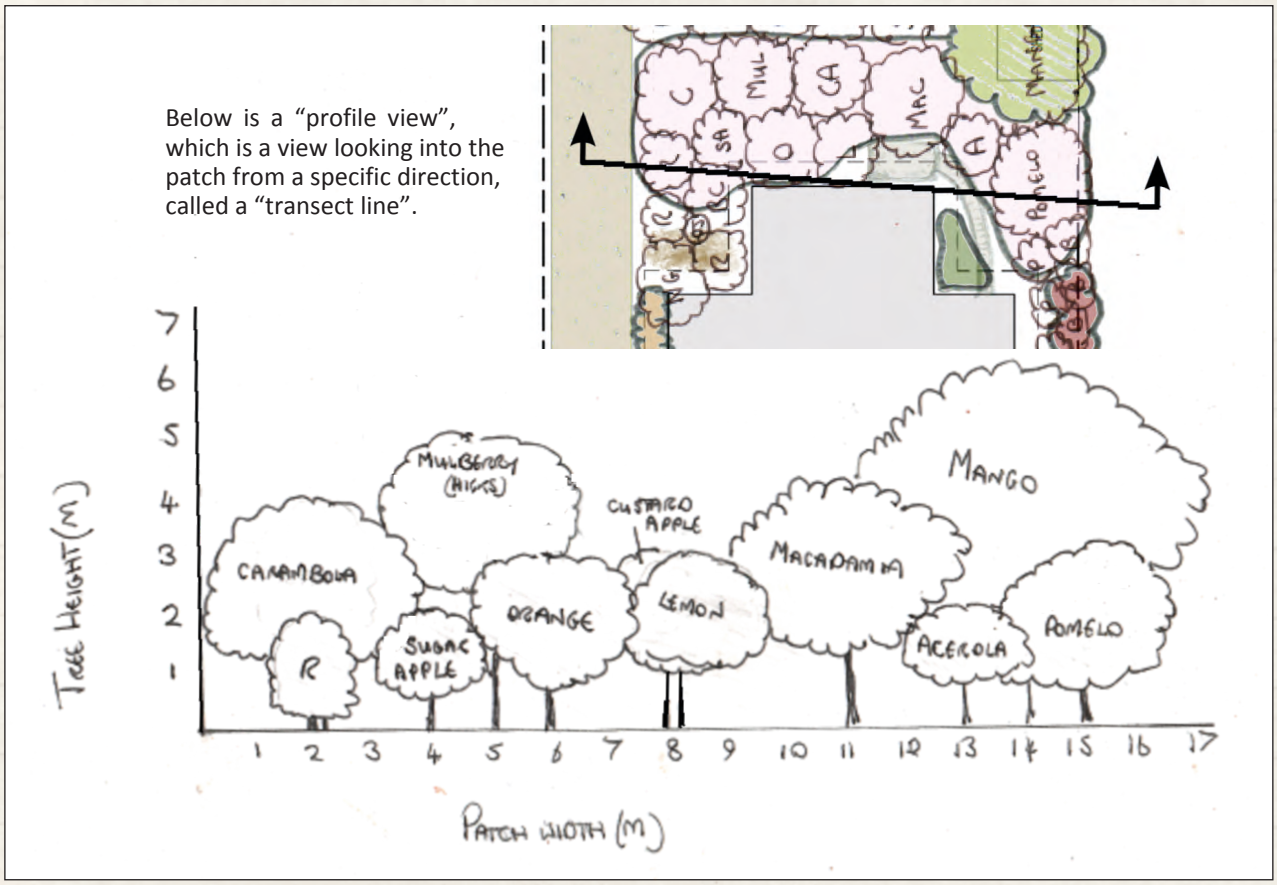
If you have selected late succession species create opportunities in your planting design to incorporate them later when your early succession species have made your site environment more suitable for them. For example in the wet – dry tropics you can establish fruit trees that prefer wet tropical climates, once you have created light shade and wind protection.

$$\text{Planting distance} = (\text{diameter1} + \text{diameter2}) \times 0.4 + \frac{(\text{diameter1} + \text{diameter2})}{2}$$

$$\text{Planting distance} = (5 + 3) \times 0.4 + \frac{5+3}{2}$$

$$= 8 \times 0.4 + 4$$
$$= 3.2 + 4$$
$$= 12.8\text{m}$$





Below the canopy

Now we need to decide what species we will plant under our canopy, the understory. Referring to your description of the architecture desired for each patch, look at the scaled drawings for the canopy in each of the patches. Convert these sketches from an aerial to horizontal view by drawing a graph with the length of your patch on the horizontal axis and height on the vertical.

Show the relative positions, height and width at maturity of each of your canopy plants. You will probably have plants positioned behind other plants, but just shade them in a lighter colour to give a distance perspective. Don't get too hung up with the details. It's the overall perspective we are after. If any of your canopy trees create dense shade it maybe useful to show this.

Use tracing paper overlays again to explore how your edible landscape will look with your different understory species and different planting patterns. Draw in the plants using width and height at maturity. Visualising your planting design in the patches shouldn't be too complicated if you are experimenting with seven or less species as recommended, but draw a profile from another angle if it helps.

In visualizing the architecture you have inevitably taken a snap shot at a particular time in the lifecycle of the landscape.

It's a good idea to draw the landscape as it will appear when the canopy trees are mature. Dave Jacke calls this the horizon time, because we envisage our planting at a stage where it is difficult to see what lies beyond. Just like looking at the horizon.

In reality our trees and understory plants will take different times to reach maturity. Growth and survival rates will vary considerably with site, environmental conditions and maintenance and in unexpected ways as we discover the nuances of mixed plantings and the patterns of succession.

Succession is the changes in plant community composition and structure over time. Obviously your species selection and planting design will have a major impact on the pattern of succession in your landscape. Will the species you have selected grow well on the site? How will your planting design, site preparation and maintenance effect differential species performance?

Succession is not deterministic. It is not something we can completely control without massive interference and therefore hard yakka.

However, having designed succession using your understanding of the site and plants, you can move forward with your landscape, with only fine tuning needed here and there, keeping your goals in mind.

While these visual models have their limitations, they do provide us with a tool to visualise our plantings and to see if we can improve our designs:

- Will the design create the vegetation layers and other architectural features (density and patterning, and so on) that were desired for each patch?
- How long will your different plants take to grow and how will their growth affect neighbouring plants?
- Will your food plants thrive in the conditions your planting has created especially in relation to shading?
- Will the plantings quickly build above-ground biomass, suppress weeds and soften the climate of exposed sites?

Use information in the Edible and Ecological Plant Tables to get some of the information needed.

Try to picture and plan for the changes that will happen with succession as plants grow, mature and die. It may be helpful to draw some additional profiles at different time intervals to show how the plantings will change and make some notes on suggested supplementary plantings for a future date.

> ***"If you have 80% of your fishing net intact it will still work, but if your fishing rod breaks you aren't going to catch any fish"***
>
> ***Geoff Lawton***

An eye for the perfect patch

For each patch we should end up with 3-7 plants that are appropriate to the ecological conditions in each patch, will work together well in the near and longer term, and which help meet the Goal Statement outcomes we documented back in Step 1.

Refer to the Useful Principles table (next page) and try to develop as good a design as you can. However, there is no need to tie yourself up in knots striving for perfection. Nature will be there helping you and ultimately conducting your performance.

Maximise co-operation	Minimise competition	Create biodiversity	Reducing the work load
Companion planting Place species known to grow well together near each other. Example – beans, corn and pumpkins. Beans supply the nitrogen for the pumpkins and corn, and use the corn as a climbing frame.	**Separate plants with similar needs** Plant separately species with similar niches. Example – replace grass with non-competitive species like ground covers and herbaceous plants providing ecological functions (Principle Resource partitioning)	**Go native** Use native species whenever you can instead of exotics. Native species generally support more biodiversity.	**Ecological Analogues** Substitute useful but challenging plants with ecologically similar species or varieties providing similar benefits without the challenge. For example substitute cow peas for Lab lab in your early plantings as cow peas are less vigorous climbers.
We have different needs Plant species and/or varieties together which have different needs (ecological niches). Example – shade loving herbaceous plants under sun loving trees	**Shallow rooters make great competitors** Select deep rooted plants whenever you can	**Select plants with different forms** Increase your biodiversity. By selecting plants with different growth forms - clumping and running ground covers, grasses, gingers, and herbaceous plants of all sorts of sizes and shapes	**I don't dig roots** Plant root crops away from plants that don't enjoy having their roots disturbed
All that meat and no potatoes Include long lived legume trees in your plantings to feed your food trees in the future. Species that will happily grow between your fruit trees and others producing light shade and overarching canopy to shelter your more sensitive trees.		**Create patterns** Create patterns in your patches by varying the distances between your plants (clumping, random, clustering), using changes in microhabitat within your patches.	**Can you believe they are still eating annuals** Use perennials and self-seeding plants in preference to annual and bi-annuals to save you time and money.
		Get networking Think about how you can design your plantings to build connections between your plants and the other components of your ecosystem – herbivores, predators, decomposers and the physical features.	**Easy picking** Plant foods you frequently harvest at the edges of your patches - close to paths
			Get a helping hand Use non-invasive 'weed' species already growing on your site that provide important ecological functions.

Useful Principles

The perfect patch involves thinking about how you can:

- increase biodiversity and complexity in the network of relationships between your plants, animals and physical environment;
- design your plantings to maximise co-operation between plants and reduce competition, and
- make your landscape more self-maintaining

We have created the tool box here to help you do this.

By understanding and applying ecological theory we increase our chances of achieving our design objectives, but this is no guarantee. Trial, error and observation will always play an important role. Each polyculture design essentially represents a test of the theory and knowledge we have available and an opportunity to improve…The reality in the field will ultimately guide us. If we watch closely and ponder skillfully, we'll learn a lot along the way" - Dave Jacke

That's a wrap!

Congratulations you have completed your final design step in this handbook and, we hope, started a life long journey exploring ways to develop our edible landscapes into food growing ecosystems.

Here is a summary of the steps you have taken:

- deciding what you want to achieve – your goal statement
- creating your site plan
- assessing and mapping the environmental conditions on your site
- using your site plan and site assessment to play with different layouts for your edible landscape before creating your detailed layout
- putting together a list of food plants and and plants to create ecosystem functions adapted to the environmental conditions on your site, and
- designing the plantings for your patches

Your landscape will always benefit from the fine tuning we can achieve as we improve our skills in edible landscape design. However, congratulations are due, as you have taken a major leap, and in so doing have designed an edible landscape where by working with nature, nature does a lot more of the work.

As you discovered these steps can be used to build ecosystem functioning in a wide range of edible landscapes. Helping us improve our veggie gardens, orchards, and to design food growing ecosystems imitating natural vegetation communities. In using the design techniques in this Guide we are only really limited by our imagination and desire to try something different. Our reward – healthy food, less hard yakka and landscapes regenerating our environment.

Taro

Taro is another tropical staple food that is great to grow if you have a dam or permanently damp or boggy spot because it loves water.

If you haven't used taro before, beware that the skin of the corm (root) and the leaves and stem contain oxalic acid crystals. This means that you must cook them well before eating or else you can get an unpleasant scratchy feeling in your throat. Peel taro corms thickly dry (don't run them under water) as thick peeling removes the high concentration of oxalic crystals in the skin layer. Taro can be boiled, steamed, baked in an oven or baked in the ground the traditional way. If baking in the oven I prefer to bake it covered with some liquid as otherwise the flesh can be quite dry.

If you need to avoid pasta because of gluten or egg intolerance, or if you simply have taro available, then the following recipe is simple and produces soft pillows of gnocchi-ness, the perfect canvas for your favourite pasta sauce.

This recipe works best with a large taro corm as that allows for a greater number of similarly shaped 'gnocchi' pieces.

Taro Gnocchi

Cut slices about 2cm thick per person across the taro corm and peel the rough outer skin off thoroughly.

Cut into batons about 2cm across, then cut each baton into sections about 3cm long each (the segments on the outer edges will obviously have a slight curve on one side).

Allow about 8-10 'gnocchi' pieces per person. If you are using a very large taro corm, one slice will produce about this many pieces.

Bring a very generous amount of water to the boil and season with salt.

Add the taro and keep the water on a rolling boil for between 15 – 20 minutes, depending on the size of your pieces and the dryness of the taro. The 'gnocchi' are done when a fine skewer easily penetrates through one of the largest pieces.

Drain immediately and serve with your favourite pasta sauce.

When tomatoes are in season, make a simple sauce of pureed tomatoes with lots of finely chopped basil, a bit of salt and fresh ground pepper, a glug of virgin olive oil, and shavings of parmesan. Yum! Can't go wrong with simple flavours.

Digging In!

Here we move beyond design to getting our hands back into the soil, preparing our site, planting out, and maintaining our edible landscape. We focus on landscaping in the wet-dry tropics and on techniques that support our approach of working with nature.

Sourcing plants

Buying plants is not cheap. However there are lots of different ways of sourcing plants other than nurseries, many of which we list in the plant tables for the species listed.

Ground cover biomass accumulators and legumes are best grown from runners and seed spread directly on site. Legume seed can usually be purchased in bulk from agricultural seed stockists.

Buy non-hybrid seed so that they will self seed. If you have the time and resources to propagate other plants from seed that's great, and for some species, like fast growing legume shrubs and trees sourcing the actual plants is difficult.

Many of the other plants listed can be propagated by cuttings, collecting suckers and corms and so on. For some of the more specialized native plants and long-lived legume trees you may need to research different suppliers.

However, you can generally source quite a lot of planting material from within your com-

Working safely

You may be doing the landscaping work yourself or working with a team of volunteers, whatever the situation, before commencing work identify and document any hazards and assess risks on the project site and associated with the tasks you will be undertaking. Then take action to remove the hazards and control the risks. There may also be organisational policies and procedures which you need to follow. Pay special attention to underground and above ground services and any plants that maybe dangerous. Operate tools, equipment and machinery in accordance with manufacturer's recommendations and wear appropriate personal protective equipment and clothing. Refer to landscaping industry standards and organisational policies for further guidance.

Working legally

Before commencing any landscaping you need to ensure the activities you undertake will not impact on environmental assets on your worksite and adjoining areas. Through your site assessment and species selection you will have considered this issue. However you are also responsible under the Environmental Protection Act 1994 for ensuring that your landscaping activities will not cause soil erosion and water pollution through contaminated runoff. It is also worth keeping in mind that many local Councils, through their Local Laws, have various controls on vegetation deemed to be causing a nuisance. Nuisance vegetation can cover a gambit of things but generally it is described as vegetation overgrowth, vegetation likely to harbour reptiles, or create a visual intrusion. We may disagree with these definitions of nuisance vegetation, but we can still have landscapes that are "maintained disorder rather than tidy" as Geoff Lawton describes.

Brazilian Spinach

This hardy green is a must for a tropical food garden. It survives neglect quite well but will reward you if given partial shade, regular water, good soil and a fortnightly spray of diluted seaweed solution. When treated well it puts out large, rounded green leaves that crinkle inwards at the stem connection. When so much else has died off in the build up and wet season, it keeps on going.

Pick leaves off the stems into a colander and wash well. Dip in boiling water for a minute or so then refresh in cold water and dry to use in salads. Add to cooked dishes just as you would silverbeet or spinach.

Pasta Brazilian

- **1 tablespoon virgin olive oil**
- **1 small red onion, finely sliced**
- **1 sprig fresh rosemary (or thyme or oregano)**
- **1 sprig fresh tarragon (or basil)**
- **10-12 anchovy fillets (or a handful of sliced olives)**
- **800g (2 standard tins) crushed tomatoes**
- **8-10 branches Brazilian spinach, leaves stripped & washed (or 1 bunch spinach, or 4 leaves silverbeet)**

Heat olive oil over medium heat, add sliced onion and cook gently until softened but not browned. Add herbs and anchovies (or olives if using), stir for a moment, then add the tomatoes.

When the sauce is starting to simmer, add the Brazilian spinach. Cook for about 5-10 minutes, until leaves are well wilted. Serve with freshly cooked pasta of your choice. Serves 3-4 people.

Hint: if you have some sauce left, leave it in the saucepan in the fridge overnight.

In the morning, reheat it and as soon as it is warm, break an egg into the middle, put the lid on, and cook until the egg is just done.

Makes a hearty, tasty breakfast to kick you off for the day!

BRAZILIAN SPINACH

Alternanthera sissoo

Limited selections with purple and green stem types.

Height	50cm	clumping ground cover
Width		

Plant branch cuttings with 2 nodes exposed or potted plants.

Excess growth can be trimmed.

Sun Tolerance	Wind Tolerance	Min Water
part shade	moderate	monthly

Drainage	Soil needs	Root depth
seasonal wet	tolerant	shallow

munity. For example local seed savers groups, permaculture groups and garden clubs, your neighbours (and friends of your neighbours).

We have included some resources on plant propagation and seed stockists in 'Getting More Information' at the back of this Guide.

Preparing your site

There are lots of existing resources on how to construct landscaping infrastructure like paths, hills hoist, patios, and irrigation which we don't need to replicate here. Our goal is helping you to create the site conditions supporting your plants and your landscape to function more like a natural ecosystem.

How do we prepare our site to maximise the survival and growth of our plants? We know that they can tolerate the site conditions as it is now, because we have selected species to suit the environment. We may have chosen a few special plants that need extra tender loving care, but they are one offs. What in general do our plants need from the site to flourish? A healthy soil ecosystem, minimal competition, sufficient water and depth of soil.

Building a healthy soil ecosystem

If you haven't already had your soil tested, do so now using a company that provides independent advice not tied to the sales of fertilizers. Don't just rely on a pH test. pH tests tell you very little about what may limit plant growth on your site. Soil tests will tell you (without going into too many technical details) the balance of Calcium, Magnesium, Sodium, Potassium and Hydrogen in your soil. Their balance has a major impact on the structure and friability of your soil and hence the physical environment within which plants and soil organisms survive. By balancing these minerals rather than focusing on pH you

Here are some useful things to keep in mind in preparing your site for planting.

Most of our soils need repair before they will grow healthy plants producing healthy mineral-rich food – lack of care over the years has knocked soil minerals out of balance and soils have lost most of their organic content

Soils are like humans – if they are healthy they don't get sick so easily making your plantings more resilient to pests and diseases too.

Soils are alive - Soils are teeming with living organisms. You may have seen earthworms, snails and beetles, however there are many more types and even more microbes - those critters not visible to the naked eye. With balanced minerals, lots of organic matter you get lots of soil organisms and a healthy soil ecosystem.

Weed seeds love bare soil with lots of light. Cover your soil with mulch and living ground covers and you will have few weeds

Good soil structure is maintained by soil organisms, especially fungi and bacteria and balanced minerals rather than digging.

will improve the structure of your soil and as an added bonus also adjust the pH in a way that suits your specific soil.

Using the recommendations from your soil test first work on getting your minerals balanced and add tons of organic material. Leave your soil about 3-6 months to rebalance itself, and then address any nutrient deficiencies. Both the major stuff like nitrogen and phosphates and also the micronutrients, your zinc, boron, iron and so on. If you can, get cover crops established in the intervening period, selecting species to provide many of the ecological functions we have mentioned.

Reducing competition

You will have done as much as you can to reduce competition between your plants by planning your planting design. However what about the plants already growing on the site? Will they compete with your plants reducing their growth and even chances of survival? If the existing vegetation will have little impact, then design your site preparation and planting activities to minimize damage to the vegetation. It is almost certain that you will need to remove many of the non-native grasses like Couch, Brachiaria and Kikuyu. As an interesting aside, grass also creates bacterially-dominated soils and your trees and shrubs generally want fungal-dominated soil.

Hand digging and herbicides are not the only ways to remove these competitors. There are other techniques that will have less impact on your soil and back!

- Mulching – this works if you have access to loads of mulch and can layer it thick enough to kill the vegetation underneath by cutting out sunlight. Try to source local supplies.
- Weed mat - use woven weed mat that lets air and water through. You don't need to mow or slash first. Just role out the matting and cover with mulch to at least 15cm thick. Wait 6-8 weeks, spread seeds of ground cover legumes and other biomass accumulators over the mulch, pull out the weed mat and spread out the mulch. Spreading out the mulch will mix in the seeds. Roll up the weed mat ready for another time, and give the seeds a good watering.
- Newspaper and cardboard – suitable for smaller areas. Overlap five plus sheets of newspaper or cardboard and cover with at least 15cm of mulch.
- Chook bulldozers – use chooks to clear the ground (see Geoff Lawton's YouTube – Survival food forest with chickens: Zero to ten years tour).
- Disking - on large sites you could use a disc plough to invert your soil, burying surface weeds and trash, but it's not 100% effective.

The amazing and wonderful Queensland arrowroot

Providing sufficient water

Water is a big issue in seasonally dry climates where there can be months without rain. You will have chosen plant species that can tolerate dry times and from your site assessment identified opportunities to use greywater, wetter patches in your landscape, stormwater and ways to reduce runoff using earthworks and simple absorbent structures. What is often overlooked are the benefits of increasing the organic material in our soils. Clay in soil stores water, but organic material is much more effective. As Bill Mollison states, your goal should be maximum wet season soil water storage to carry over to dry periods.

Planting out

Giving your plants a good start in life is crucial. We have included detailed information on how to plant the species we have listed, which should cover some of the more unusual planting techniques like those for cassava and taro. Standard garden and horticultural texts will provide most of the general information you require.

In simple terms plants need root space, access to all the nutrients and water they need, and a microclimate that suits them. Our job is to meet their needs. Hence we dig plant holes with loose soil around but not under the roots, helping the plants send roots outwards and preventing them sinking down. Plus we give them organic fertilizer and water to get them started.

Layout your site using posts to mark your planting spots. This will help if you have other people giving you a hand with planting and down the track with finding your plants amongst your carpet of ground covers.

Watering is a challenge in the dry tropics. Do all your site preparation work during the dry season and plant in the wet season if you can. Reduce heat stress if possible by timing planting for when several days of rain or overcast conditions are forecast. Otherwise schedule your plantings towards the end of the wet when the sun isn't quite as strong.

However with the wet seasons we have been having recently flexibility seems to be the key. If you can't plant out trees and shrubs in the wet, at least get the legume and other ground cover seeds out, using the wet and overcast days to give the seeds a good soaking.

If you plant out in the dry, we suggest just focusing on the trees and shrubs, saving establishing the ground covers and herbaceous plants till the wet. In town areas water needs to be paid for. So see if you can borrow a water truck (like the local bush fire groups use) and organise a permablitz to plant on one day. Give every plant a really good watering and come back with the truck in one-two weeks and after a month or so, depending on the weather, plant growth, and soil moisture around the roots of your plants.

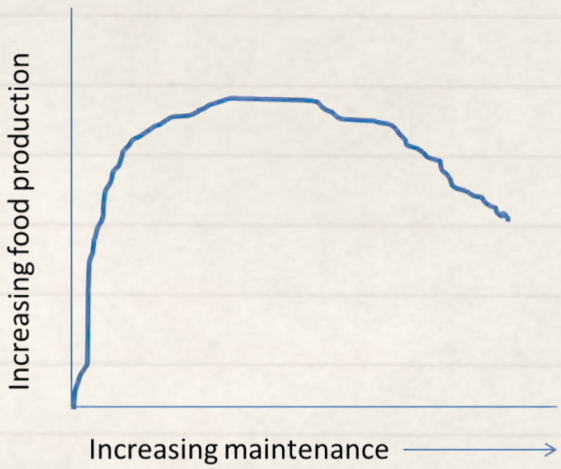
Looking after your edible landscape

By designing edible landscapes that work with nature we have by default created edible landscapes that don't require the same level of maintenance as conventional landscapes. The degree to which they become self-maintaining depends on how far your design is along the spectrum from conventional landscaping with plants adapted to the site conditions to fully fledged food growing ecosystems mimicking the structure of native vegetation communities.

There is lots of information about veggie gardening, looking after your fruit trees and organic gardening in general. We have included a list of some of the best ones for the dry tropics in 'Getting more Information'.

In wet-dry food growing ecosystems maintenance jobs like weeding and mulching become infrequent events as the plants produce their own mulch, the diversity of species and interactions between them, reduces pests and diseases, and the plants recycle nutrients back into the soil, minimising the need for fertilisers. You also spend less time fighting against succession by mowing, whipper snipping, pruning and lopping. Instead your time is spent working with succession, improving the health and resilience of your food growing ecosystem and harvesting healthy food.

Too much and inappropriate maintenance can actually reduce food production as you throw your self-maintaining edible landscape "out of balance, disrupt essential functions and increase your system's reliance on intervention to maintain balance" (Dave Jacke). As the graph shows small amounts of maintenance can make a big difference to the amount of food produced from food growing ecosystems, but too much interference may actually reduce productivity as we start reducing the natural functioning of the system.



Food growing ecosystems can suffer neglect and bad weather, but if you give them some tender loving care they will produce more food for you to harvest. Imagine the amount of money you will save, your guests' surprise as you walk into the house with baskets of food, and the joy your kids will get from foraging in the garden.

Watering

You will have selected plants depending on the amount of water they are likely to receive especially over the dry season. In many towns gardeners have to pay for every drop of water they use, so it is useful to realize that for most plants too much water will not make them grow any faster. However all plants require water to grow, and not enough water will slow their growth and even kill them.

The right amount of water for each plant will vary. It will also vary with the age of the plant, weather conditions and the soil type. Increasing organic material in soils will reduce the amount and frequency of watering required. Without much water, plants will show signs of severe stress by their leaves wilting or curling.

Machete maintenance

Nearly all of your maintenance can be done with simple hand tools like machetes and secateurs. Permaculturists call it 'chop and drop' because you are doing two jobs in one - cutting back some plants to encourage others while also creating valuable mulch. Chopping and dropping legumes releases the nitrogen they have collected, which soil organisms move around and donate to your other plants. Unseen, underground your cut back plants respond by self- pruning their roots creating corridors of mulch.

For the first couple of years your main task will be chopping back any ground covers growing over your young plants. Don't get too carried away however, as they don't mind a little shade. Later on there will be biomass and nutrient accumulators, like the banana leaves and suckers to cut down and you can selectively cut back some of your fast growing trees and shrubs to create more mulch and light where needed.

Weeding

Using weed suppressing plants and fast tracking succession should minimize weed issues. We often spend so much time hating weeds that we don't stop to look at how they maybe helping us. Weeds are only a problem if they are not performing an ecological function. Even invasive and prohibited weeds can be used if they are already on site, but it is crucial that you cut them back before they set seed. That way you will get to benefit from them before they naturally die out with succession. Weeds are species that generally colonize disturbed and degraded land so they are adapted to help us kick start succession. Many provide the ecological functions we seek, being nitrogen fixers, biomass and nutrient accumulators, and some even taste quite nice! So work with them when you can. Cut and drop allowing them to create the biomass you need. Rarely do you need to remove the plant. Couch and other plants that readily re-establish themselves in wetter times are an exception.

Fertilising

Lots of fertiliser isn't essential if you have improved your soil as part of your site preparation and included plants providing ecological functions in your design. Your biomass and nutrient accumulators and nitrogen fixers will kick start your nutrient cycles. Fertilising can help you orchestrate your succession by boosting the growth of selected plants. Source locally if possible and preferably use compost, manures that have been composted (this includes pelleted chook manures but not raw manures), seaweed and fish emulsion and biofertilisers.

Pruning

This is another chore that good design minimises. You will have selected and designed your layout of tree and shrub species to reduce future problems with oversized trees, branches damaging buildings and leaves filling guttering.

Your trees and shrubs will produce food without pruning, but pruning is one maintenance job that can make a big difference to the amount of food your tree will produce and the

amount of food you can reach to harvest. Pruning is best done as the tree grows. Careful pruning of excess branches and keeping the height down is relatively easy in the first few years of establishment.

Most large trees can be cut back to a manageable size. Chain saws are useful for this but make sure the operator is competent. Cut surfaces can be painted with water-based paint to aid their healing.

Supplementary plantings

Changes will occur to your edible landscape as plants grow and die. Observing these changes will give you the confidence to step in and plant new species providing food and ecological functions adapted to the changed environmental conditions.

Increase biodiversity by planting native and species with different growth forms. Increase ecological redundancy by planting more varieties of food plants and more species to provide ecological functions. Replace plants causing maintenance problems with similar species that provide the benefits but not the challenges (ecological analogues). Grow and explore the delights of perennial veggies.

Papaws

Papaw plants can grow for over 10 years. They grow fast in warm, wet weather but slow during cooler, drier months. Single stem papaw plants usually produce fruit that is out of reach within 3 years. To reduce the height and maintain the plants vigor, tall plants can be cut back and encouraged to produce 2 or 3 shoots. Cutting back is best done during the wet season but care needs to be taken to prevent rotting of the cut stem. Covering the stem end with a tin can is okay, but painting with a copper/water paint mixture before covering is best.

Beans rule

Legumes are an important group of plants for edible landscapes. They produce nutritious leaves, flowers, pods, seeds and roots, more importantly, are one of the best methods of building the soil organic matter and supplying nitrogen. When they are cut back they release a rich source of mulch for your soil, but also the plant prunes its own roots, making nitrogen available within your soil profile.

Lumps and bumps on roots of legumes, like bean plants, are very beneficial. These lumps (nodules) are part of the plant, but in them are various types of bacteria called rhizobia. These minute organisms have the amazing ability to get nitrogen gas from the air, collect it and give it to the plant in a form that the plants can use.

A hectare crop of cowpea can fix 100kg of nitrogen which is roughly equivalent to 250 kg of urea fertilizer.

Various legumes need specific strains of rhizobia. Without the correct strain the legume plant will not have its own supply of nitrogen and is likely to be weak growing and pale green.

Seed supply agents can usually supply the correct group of rhizobia with the legume seed. Applying this bacteria to the seed at planting is called inoculation.There are various inoculation methods, usually involving covering the seed with a wet slurry, drying in the shade before planting into cool moist soil. Sometimes the slurry has lime in it as most rhizobia don't flourish in acid soils.

Creating self-mulching and fertilising Orchards

Are you planting a few fruit trees in a garden or even hundreds in a commercial orchard, but just focusing on creating the tree layer, with your ground vegetation just something you will manage?

Instead you could use the steps in this handbook to convert your ground vegetation from completing grasses and weeds to plants providing ecological functions to support your fruit trees.

Legumes to provide nitrogen, ground cover legumes and other ground covers producing mulch and suppressing weeds, together with herbaceous plants producing nectar for beneficial insects.

Bananas

Banana plants are mostly planted as suckers from a mother plant. When the new stem is growing, it will produce suckers of it's own around its' base.

To get good bunches, reduce the number of suckers to one or two for each fruiting stem. If most of these suckers are not trimmed the result will be a thick clump producing very few bananas and suffering more from pests and diseases. Once the bunch is harvested that stem is cut off. Banana leaves and stems make good mulch.

Wrap up

With maintenance it's up to you. The closer you have designed your landscape to mimic natural ecosystems the less maintenance you will need to do, and like we said at the beginning of this journey, we will help you design foodscapes producing food even given virtually no maintenance, but produce more given a little tender loving care!

Improving our skills

Nature has had millions of years to fine tune the process of creating ecosystems, learning from its experiences. We can do the same. While we will look back and say "we could have done this or that better…", we can only create opportunities to learn by getting out the paper, measuring tape, spade and handbook and having a go.

Jot down your observations and thoughts as you work through the design process, landscape your site and check the progress of your plantings. As you research the different species, their ecological niches, plant forms and discover what benefits they provide, add your findings to the plant database so others can benefit from your research.

We would certainly like to hear back from you about the design process. What worked well for you and how we could improve the process. Developing the design process has been and will continue to be a learning experience in its own right.

We can all learn from each others experiences in creating ecological functioning in edible landscapes. So share your experiences with your neighbours, members of local garden, organic grower and permaculture groups and wider afield via existing networks on the internet.

The Remote Indigenous Garden Network (www.remoteindigenousgardens.net) and Permaculture News (www.permaculturenews.org) have existing forums you can use.

Getting more information

Assessing your site

- Soil Health Card (www.soilcare.org)
- Comprehensive search engine for Australian weeds (www.environment.gov.au/index.html)
- Gardening with Grey Water (www.nrm.qld.gov.au/waterwise/gardening/pdf/gardening_with_greywater.pdf)
- Declared Plants Factsheet (www.daff.qld.gov.au/documents/Biosecurity_EnvironmentalPests/IPA-Declared-Plants-Qld-PP1.pdf)

Sourcing Plants

- Austrahort (www.austrahort.com.au/contact) – good seed source for fast growing legumes and other unusual plants
- All Rare Herbs (www.allrareherbs.com.au)
- Non-hybrid fruit and veggie seeds:
  - Diggers Club (www.diggers.com.au)
  - Eden Seeds (07) 5533 1107 (www.edenseeds.com.au)
  - Greenpatch Seeds (02) 6551 4240 (www.greenpatchseeds.com.au)
  - Green Harvest 1800 681014 (www.greenharvest.com.au)
  - Local Seed Savers Networks (www.seedsavers.net)

Selecting and growing tropical plants

Good sources of information on tropical food plants and their preferred growing environments:

- Cooktown Club Veg Planting Guide
- Your local nursery
- Neighbours
- Local permaculture, seed saving and veggie gardening groups
- Google images – great way to get a feel for what the plant looks like and different growing situations
- Wikipedia and sources of further information provided
- Bill Mollison, 1988, Permaculture A Designers' Manual, Tagari Publ.
- Plants for a future (www.pfaf.org)
- Let's Propagate! A plant propagation manual for Australia Angus Stewart, Allen & Unwin, 2012, ISBN: 9781742375816 - A recent publication for the Australian environment

- Remote Indigenous Garden Network (http://www.remoteindigenousgardens.net)
- Tropical Food Gardens: A Guide to Growing Fruit, Herbs and Vegetables in Tropical and Sub-tropical Climates, 2001, Leonie Norrington
- Agroforestry tree database (www.worldagroforestry.org)
- Successful Gardening in Warm Climates, 2008, Annette McFarlane,
- Top End Gardening – Your practical guide to establishing a productive garden, 2010, Lachlan McKenzie, Melanie Bradley & Nicholas Gouldhurst, Environment Centre NT.

Interesting ways to prepare your site

- **Food Forests** (www.youtube.com/watch?v=QG_vRG66wkA)
- **Using chickens** to remove competition for your plantings (www.youtube.com/watch?v=6wI9Arel9tQ)

Examples of edible landscape designs

- **Donut Gardens on Thursday Island** (www.remoteindigenousgardens.net/)
- **300 year old food growing ecosystem** www.youtube.com/watch?v=-5ZgzwoQ-ao
- **2,000 year old food growing ecosystem** www.youtube.com/watch?v=hftgWcD-1Nw
- **Food growing ecosystems in veggie gardens** www.youtube.com/watch?v=XYfZf5Nllsk
- **The Land Institute** www.landinstitute.org
- **Edible Forest Gardens** www.edibleforestgardens.com
- A well designed **food growing ecosystem** created by Martin Crawford in the UK www.youtube.com/watch?v=GFbcn06h8w4 Forest garden

COOKTOWN PLANTING GUIDE

Proudly supported by
Cooktown District Community Centre
11 Charles Street, Cooktown 4895

Club Veg Community Gardeners Eating Fresh COOKTOWN

Create your own no-dig vegetable patch
by placing clean hay approx 350mm thick across your 'patch'
Frame it with timber or use large pots. Sprinkle compost, manure, dynamic lifter ,wood ash , garden lime,

WHAT TO PLANT & WHEN

	Capsicum, Celery, Chilli, Chinese Cabbage, Chives, Corn (Jolly Roger, Balinese and Australian hybrids), Cucumber (Asian such as Suyo Long, African Horned Cucumber, Giant Russian), Raddish, Rosella, Snake-beans, Sweet potatoes Squash, Sunflower, Sweet Potato, early tomatoes (Tropic, Broad (Yellow) Ripple Currants and Tommy Toe), chicory, parsnips,
APR/MAY (LATE WET/	Beans (Dwarf Beans, Climbing Beans,) Spinach, beetroot, cabbage, cucumber, pumpkin, capsicum, turnips, leeks, all your
JUNE/JULY/ AUG/SEPT	Plant zuchinni, eggplant, capsicum, lettuce, rocket, pumpkin, and other cubits, coriander, parsley and other herbs
OCT/NOV/DEC	corn, snake-beans, sweet potatoes, watermelon, yam, lettuce (Mizuna, Bibuna, Great Lake, Darwin Lettuce,, Royal Oak

Consider creating small no-dig gardens from recycled drums & tanks . These can be raised to protect the soil from nematodes & if moved under cover may allow you to plant the following anytime of year!

ANYTIME Planting in unprepared soil and in extreme condi-	Arrowroot, Asparagus, corn, eggplant, Sweet potato, basil, turmeric, ginger, galangal. Mexican Coriander, Brazilian Spin- ach, Cassava, Aibika, Spring Onion Shallots, Garlic Chives, Tree Lettuce, Mushroom plant, Ceylon Spinach, Lemon Grass,

CLUB VEG TOMATO TIPS

Snap off all but 3-4 stems from your plants" t hat way the plant÷ s energy is chan-neled into fewer, primary stems producing bigger fruit. Additionally prune the larger shade leaves from the plant to increase airflow and light to the fruit.

Consider staggering a range of fertilisers, including blood and bone,

CLUB VEG INSECT REPELLANT

10ml Lemon Euc Oil; 100ml

CLUB VEG gratefully acknowledges the support of the following local suppliers:

Boruca Farms for mulch hay– 40603974. **Top End**

EDIBLE LANDSCAPE DESIGN FOR UNITS ON JOHN STREET, COOKTOWN

Specifications provided by Housing Provider:

1. Food growing ecosystems should cover the whole site (no requirement for lawn)
2. Landscaping costs not to exceed $1000
3. Low maintenance design with minimum watering required during dry season
4. Provide some relief from strong prevailing south-easterlies
5. Tenants can harvest food all year round
6. The landscape should provide a place tenants like to spend time in

GOAL STATEMENT

Goal	Very important	Interested	Not so important
Growing food for snacks and casual harvest	Y		
Growing food for main meals	Y		
Growing plant products (eg. plant dyes, herbal medicines)			Y
Creating a gentle microclimate	Y		
Creating privacy	Y		
Creating an attractive landscape; flowers, birds, etc)	Y		
Reducing garden maintenance costs	Y		
Reducing housing maintenance costs	Y		
Reducing housing 'cooling' costs	Y		
Others:			
Creating a landscape children and explore and playing		Y	
What will your edible landscape look like?	Enclosed spaces		
What emotions/feelings would you like people to experience in your landscape?	Cosy and lovely to spend time in relaxing		
What natural vegetation community will your food growing ecosystem imitate? Choose something like open woodland, rainforest, etc.	Open forest - fairly open canopy allows sunlight to penetrate. Thus understory of smaller trees, shrubs, groundcovers, grasses & vines is well developed.		

Dr Wendy Seabrook, Hill Top Farm - working with nature.
07 4069 5058, hilltopfarm.wix.com/beyond-sustainability

DESCRIPTION OF PLANTING DESIGN FOR UNITS ON JOHN STREET

Here are is the list of species and brief comments on some of the rationale for choosing the different plants. This information was provided to the John St housing provider as a supplement to the planting design.

GROUND COVERS ACROSS THE SITE

We could vary the ground cover species between different patches in the food growing ecosystem, depending on their environmental preferences. For example Pintos peanut is very tolerant of shade, whereas Cow peas prefer full sun. However we thought that this site would be a good opportunity to experiment to get a better feel for how well these ground covers grow in different conditions. We also don't have much experience of how these species do as mixed plantings, as they are rarely planted this way. Planting a mixture will also create ecological redundancy- not putting all our eggs in one basket, and help us build biodiversity by having different plant forms.
We will use the following species:

Cow pea (*Vigna unguiculata)* Ebony (perennial variety)
Sweet potato (*Ipomoea batatus*)
Pintos peanut (*Arachis pintoi*) Orange var
Pintos peanut (*Arachis pintoi*) Yellow var
Greenleafed desmodium (*Desmodium intortum*)
Ceylon spinach (*Basella alba*)
Stylo (*Stylosanthes guianensis*)

Ceylon spinach and sweet potatoes can both be harvested. We will need to buy Stylo, Cow pea and Greenleafed desmodium seed, but the other plants we can probably source for free.

DESCRIPTION OF INDIVIDUAL PATCHES

WINDBREAK PATCH

This is the patch shown on the detailed design extending along the front of the property.

1. Overstory
- Mixture of wind tolerate small trees (Pink Poodle (*PP*), Resilience (*R*), Orange Jessamine (*OJ*) and dwarf coconuts (C) forming the emergent canopy. Coconuts can be interplanted in gaps, keeping in mind that they will encroach about 2m on the other plants in the early stages of growth and to plant away from pathways for obvious reasons!
- Single Lady Apple (*LA*) – a bush tucker tree and Sapodilla (*Sap*) specimens in corner. Both have tap roots helping us to improve the subsoil.
- Resilience and Lady Apples are both Syzgiums which are good screen trees as they keep their lower branches
- Pink Poodle is a long-lived nitrogen accumulator
- We have not included tall and wide spreading trees, as the windbreak patch is close power lines on nature strip

2. Inter-planting

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Initially the trees will be inter-planted with Gliricidea and bananas. Gliricidea is a fast growing, nitrogen fixing small tree that grows well in windy conditions. It can be cut back as mulch and will get shaded out eventually by the other trees. The bananas will be blown about, but will still produce biomass and help suppress weeds. If they fruit all the better, but in this patch this will not be their priority job!

3. Understory

- Dense planting of Galangal along inside of fence. Galangal is an excellent fast growing wind break, screen and source of mulch, plus it is easy to source free planting material. It will give some initial protection for the young trees and with them create a more sheltered and humid understory.
- Cassava closer to the driveway. Cassava is hardy and a good soil decompactor
- Galangal could also be planted along the outside of the fence to reduce vine growth up the fence. Arrowroot could be another more attractive alternative, also providing a vine barrier, but is not as wind tolerant.

4. Mid to late succession

When the tree canopy is more developed it will be possible to plant in the understory shade loving ginger and turmeric

IN THE PINK (A)

1. Overstory - Mandarin (M) and Tahitian lime (TL)
2. Inter-planting - Inter planted with Drumstick tree or Albizia lebbeck - fast growing small trees that will provide light shade for the Citrus, can be cut back for mulch. The Drumstick tree leaves are very nutritious. Also bananas for rapid biomass accumulation
3. Understory - Pigeon pea

IN THE PINK (B)

Informal foraging path wandering between citrus and Mango and other fruit trees next to fences

1. Overstory
    - Black Mulberry – fast growing (M)
    - Orange (O) and Lemon (L) as they food favourites
    - Native guava (NG) and Resilience (R)– wind break and bush food
    - Beach Cherry (BC), Custard Apple (CA) and Sugar Apple (SA) – passive cooling bedrooms and taller densely foliaged trees for privacy between units
    - Resilience (R) and Carambola (C) screen driveway
    - Acerola – (A) easy picking will hanging out the washing
    - Mango – planted to provide shade, wind protection and fruit for both units
    - Mulberry (Mul) , Carambola (C), Macadamia (Mac) and Custard Apple (CA)
2. Inter-planting

Drumstick tree or Albizia lebbeck, both fast growing small trees that will provide light shade for the Citrus, can be cut back for mulch. The Drumstick tree leaves are very nutritious.
Also bananas for rapid biomass accumulation

3. Understory – Aibika and Pigeon pea

IN THE PINK (C)

Informal foraging path wandering between citrus and trees next to fences

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1. Pink poodle (PP) with cassava understory along edge of driveway as an experiment – beautiful legume with root crop
2. Pink Poodle (PP) and Sugar Apple (SA) will also help screen between units
3. Orange (O)and lemon (L) with Aibika and Pigeon Pea understory
4. Inter planted with Horseraddish or Albizia lebbeck - fast growing small trees that will provide light shade for the Citrus, can be cut back for mulch. Horseraddish is edible. Also interplanted with bananas for rapid biomass accumulation
5. Mango growing over fence with Custard Apple (CA) as a companion

PRIVACY

1. Overstory
    - Sapodilla (Sap) as a break for wind rushing up the driveway
    - Carambola/Five corner (*Averrhoa carambola*)- – (C) easy to pick by the car port
    - Acerola (*Malpighia emarginata*) – (A) easy to pick by the car port
    - Resilience (R) and Orange Jessamine (OJ) as a screen from the neighbours
    - Mandarin (M) and Tahitian Lime (TL) primarily as they food favourites
    - Macadamia (Mac) in the corner
    - Inter planted with Horseraddish or Albizia lebbeck - fast growing small trees that will provide light shade for the Citrus, can be cut back for mulch. Horseraddish is edible. Also interplanted with bananas for rapid biomass accumulation
2. Understory - Galangal (along inside of fence line for privacy and rapid biomass accumulation) with Aibika and Pigeon pea.

SHADY AND QUIET

1. Overstory - Beach Cherry (BC)
2. Understory – Aibika, with edible and good looking gingers and turmeric, and Pigeon pea

EASY PICKING

This is a narrow strip between the deck and fence requiring privacy. Simple design using bananas (B) and pawpaws (P) with understory of lab lab once the plants are established. The lab lab will climb up the plants, but will provide a dense cover and lots of lovely nitrogen

SUNNY AND SHADY SPOT FOR PERENNIAL VEGGIES AND HERBS

These two beds, nestled between the path and the house provide great contained spots for tenants to put in veggies and for us to demonstrate how easy it is to grow perennial veggies. We have selected plants based on their preference to sun and shade.

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Veggie Bed Set-up Guide

HEALTHY COMMUNITIES BLOOMFIELD TRACK: LIVING WELL FROM COOKTOWN TO WUJAL WUJAL

SETTING UP YOUR VEGGIE GARDEN BEDS

WHERE SHALL I PUT MY VEGGIE GARDEN BEDS?

It's best to put your garden beds close to the kitchen so you don't have far to go to pick your veggies. However, also think about access to water and environmental issues that may affect the success of your garden like sun, shade, drainage, tree roots and strong winds. Have a look at where the sun is at different times of the day, and think about how this pattern will change at different times of the year. During our tropical summer veggies grow better in part shade, but in winter need more sun. To take advantage of the different environmental conditions can you have a couple of beds around the house, instead of just one big garden? For example a bed on the southern side or in the partial shade of a tree for your delicate leafy greens in the summer and another bed that gets more sun for winter growing. Avoid waterlogged areas or sites exposed to strong winds. Also think about where your existing watering points are. How can you design your beds to reduce the work and costs involved with putting in irrigation? You may like to take the opportunity to think about what else you would like to do with your garden in the future, and make a simple plan of your garden showing the veggie beds, other areas you would like to plant out with trees and shrubs, pathways, sitting areas, BBQ etc..

WHAT DESIGN AND SIZE

Garden beds don't need to be in straight lines, but build each bed no wider than you can comfortably lean over from one side or the other. That way you won't need to walk on the beds and compact your soil. If you are going to use weed mat (see below) make your beds at least 60cm narrower than the width of your roll so you have an overhang. Leave room in between your beds for a path wide enough for whatever equipment you plan to use to maintain the beds.

Did you know?

Organic material in soil holds 200% more water than clay and is much better than clay in stopping fertilisers being washed out of soil.

Plants feed soil microbes about 20% of the sugars they produce. In return the microbes gather many of the nutrients plants need from the soil.

A teaspoon of healthy soil generally contains 100 million - 1 billion bacteria!

CREATING LOW MAINTENANCE VEGGIE GARDEN BEDS

BUILDING YOUR EDGES

Edges stop creeping grass and weeds getting into your garden, saving lots of weeding time. Gardening stores sell edging, but you can make walls for your beds out old bricks, besser blocks, concrete, timber or corrugated iron; anything that you can find or scrounge. Dig your edges a little into the ground, and put the dug soil onto your bed. Have the walls at least 15cm high, enough to stop the grasses creeping in, and ideally have no gaps.

The Healthy Bloomfield Track: Living Well from Cooktown to Wujal Wujal project is funded by the Australian Government.

Authored by Dr Wendy Seabrook, for Healthy Communities Edible Gardening Manual. For more information contact Clare Richards, Healthy Communities Coordinator, crichards@cook.qld.gov.au m 0407 481 356 or Wendy Seabrook hilltopfarmcooktown@gmail.com 07 4069 5958

CHECKING THE HEALTH OF YOUR SOIL

Fertilisers and minerals aren't cheap so it makes sense just to buy what you need. Soil tests are an upfront cost (usually about $100), but will save you the expense of guess work by telling you exactly what minerals and fertilizers you need to improve your soil. You could check to see if any of your neighbours have done a soil test already or if they would like to share the cost with you. It is ok to do soil tests over several neighbouring gardens, so long as the soil looks the same.

Soil tests are best done by independent analysts, not fertilizers companies. The results will give you the levels of organic matter, major plant nutrients like nitrogen and phosphates, micronutrients (crucial nutrients needed by plants in small amounts), pH and other useful stuff. You can then compare the levels in your soil with their recommendations and buy exactly what minerals and fertilizers are needed to repair your soil and grow healthy food. There are also some simple tests on the internet you can do to check the physical and biological health of your soil[1]

Don't just rely on pH tests

PH tests tell you very little about what may limit plant growth on your site. Soil tests will tell you (without going into too many technical details) the balance of Calcium, Magnesium, Sodium, Potassium and Hydrogen in your soil. Their balance has a major impact on the structure and friability of your soil and hence the physical environment within which plants and soil organisms survive. By balancing these minerals rather than focusing on pH you will improve the structure of your soil and as an added bonus also adjust the pH in a way that suits your specific soil.

IMPROVING YOUR SOIL

- Apply the fertilizers and minerals recommended in your soil test.
- Apply an organic fertilizer. Compost is ideal but if you haven't got any purchase an organic fertilizer like Searles 5 in 1 or Dynamic Lifter. Animal manure can be added but it is much better to compost it first.
- If your beds have weeds, old plants or grass in them don't worry. If they are tall just squash them down with your feet.
- Lay wet newspaper over your bed, overlapping the paper and putting 4-5 pages thick. You can also use weed mat. Make sure you cover every inch and all the corners - it will save you endless weeding in the future. Newspaper and weed mat both work by cutting out the light thereby killing the grass, weeds and any weed seeds that decide to come up. Weed mat is better than plastic sheeting as it lets water and air through to the soil.
- Cover with mulch, thick enough so you can't see the newspaper or weed mat and then add a little bit more. Seed free hay or grass mulch is best,

[1] www.soilcare.org

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not woody mulch as the soil organisms use up most of the nitrogen in the soil eating and breaking down this material, leaving nothing for your leafy greens

- Keep moist and leave the beds for 4-6 weeks, enough time for the grass and weeds to die. Underneath the newspaper and mulch soil organisms will be eating the weeds and old plants turning them into organic material, and releasing nutrients ready for your new plants.
- After 4-6 the beds are ready to plant. The newspaper should be mostly gone. If not just make holes in the newspaper to plant. If you used weed mat, push back the mulch, pull out the weed mat, and replace the mulch when you are ready to plant.

PLANTING

You have now created beds that are mostly weed-free, remineralised and richer in organic matter. You are on your well on your way to a healthier soil. Initially it is better to just plant seedlings and large veggie seeds in the beds. Just make holes in the mulch and plant into the soil underneath. Add some more organic fertilizer with the plants and every two weeks spray the foliage with seaweed and fish emulsion. Wait a bit before you spread small veggie seeds.

MAINTAINING YOUR BEDS

1. If you regularly check for and remove weeds you will spend less time weeding into the future.
2. Rotate your crops – leafy greens then fruiting veggies, then root crops.
3. Keep your soil covered with organic material at all times, just like a forest soil. This can be nitrogen rich green grass clippings or hay mulch, or living mulch – green manures.
4. When you have finished harvesting and your soil needs a rest, spread green manure seeds and/or mulch. There are different types of green manure plants you can use. Legumes are great because they have bacteria in their roots which can absorb nitrogen from the air. Also include deep rooted plants to bring up nutrients from lower down the soil. Green manure plants also collect carbon from the air, increasing the organic content of your soil.
5. Spread compost, organic fertiliser or biofertilisers[2] one month before planting the next lot of veggies
6. If you are adding lots of organic material through mulch and/or green manures and you know the mulch comes from remineralised soil you will be gradually improving the health of your soil. But if not, and just to check, every few years do another soil test. Send a sample away for a soil test to check your soil nutrient levels and PH etc., and have another look at the physical and biological health of your soil. You can probably then give yourself a pat on the back - your soil is getting healthier and you and your plants stronger and more vibrant!

[2] Biofertilisers are liquid fertilisers you can make at home.

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Edible Plant Table: Species Requirements

Common name	Species Name	Height	Width	Form	Root pattern	Lifecycle	Time to Harvest	Succession	Shade tolerance	Wind tolerance	Minimum watering	Drainage tolerance	Soil quality required	Soil depth required	HAZARD
acerola	*Malpighia emarginata*	2m	2m	shrub	tap, heart	perennial	2y	middle	part shade	delicate	bi-monthly	seasonal wet	poor	deep	
aibika	*Abelmoschus manihot*	2m	2m	shrub	heart	perennial	1y	middle	part shade	delicate	weekly	seasonal wet	tolerant	medium	
amaranth	*Amaranthus spp.*	50cm	40 cm	shrub,clumping ground cover	taproot	annual	2m	early	sun and shade	delicate	weekly	seasonal wet	tolerant	medium	
arrowroot	*Maranta arundinacea*	50-75cm		clumping	fibrous	suckering	1y	early	part shade	delicate	weekly	seasonal wet	tolerant	medium	
banana	*Musa spp.*	2-3m	2m	clumping,small tree	fibrous	perennial	10m	early	full sun	delicate	monthly	must drain	tolerant	medium	
basil	*Ocimum basilicum*	1m	60cm	shrub,clumping ground cover	fibrous, heart	self-seeding	3m	early	part shade	delicate	weekly	seasonal wet	rich	shallow	
beach almond	*Terminalia catappa*	4-6m	4-6m	large tree	taproot	perennial	5y	mid,late	full sun	hardy	bi-monthly	must drain	poor	deep	
beach cherry	*Eugenia reinwardtiana*	2m	2m	shrub	heart	perennial	2y	middle	full sun	delicate	monthly	must drain	tolerant	medium	
Brazilian spinach	*Alternanthera sissoo*	50cm		clumping ground cover	heart	perennial	3m	early	part shade	moderate	monthly	always wet	tolerant	shallow	
bull's heart custard apple	*Annona reticulata*	3-4m	3m	small tree	tap, heart	perennial	3y	early	full sun	delicate	monthly	must drain	rich	deep	
carambola	*Averrhoa carambola*	4m	4m	small tree	tap, heart	perennial	2y	middle	full sun	delicate	monthly	seasonal wet	tolerant	deep	
cassava	*Manihot esculenta*	2-3m	3m	shrub	flat	annual	8m	early	full sun	moderate	bi-monthly	seasonal wet	poor	medium	
Ceylon spinach	*Basella alba*			vine	heart	annual	3m	early	part shade	delicate	weekly	seasonal wet	rich	shallow	
cherry tomato	*S. lycopersicum var. cerasiforme*	60cm	50cm	vine,running ground cover	flat	self-seeding	3m	early	full sun	delicate	bi-monthly	must drain	tolerant	shallow	
chilli	*Capsicum frutescens*	1-2m	1m	shrub	tap, heart	self-seeding	6m	early	part shade	moderate	monthly	must drain	tolerant	medium	
chives	*Allium schoenoprasum*	30cm	3cm	shrub,clumping ground cover	fibrous	suckering	5m	early	sun and shade	moderate	weekly	seasonal wet	rich	shallow	
coconut	*Cocos nucifera*	3-25m	4-8m	small tree,large tree	fibrous	perennial	6y	mid,late	full sun	hardy	bi-monthly	seasonal wet	tolerant	deep	
corn	*Zea mays*			shrub	fibrous	annual	3m	early	full sun	moderate	weekly	seasonal wet	tolerant	medium	
cow pea	*Vigna unguiculata*	30cm	40 cm	vine	heart	self-seeding	6m	early	full sun	moderate	bi-monthly	seasonal wet	tolerant	medium	
drumstick tree	*Moringa oleifera*	6m	4m	large tree	taproot	perennial	3y	middle	full sun	moderate	bi-monthly	must drain	poor	deep	
eggplant	*Solanum melongena*	1m	1m	shrub	heart	perennial	6m	early,mid	full sun	moderate	weekly	must drain	tolerant	medium	
galangal	*Alpinia galangal*	1-2m	60cm	clumping	fibrous	suckering	1y	early,mid	full sun	hardy	bi-monthly	seasonal wet	poor	medium	
ginger	*Zingiber officinale*	1m		clumping ground cover	fibrous	suckering	1y	early,mid	full shade	moderate	monthly	must drain	tolerant	medium	
Japanese pumpkin	*Cucurbita moschata*			running ground cover,vine	heart	annual	6m	early	sun and shade	moderate	weekly	must drain	rich	medium	
kaffir lime	*Citrus hystrix*	3m	3m	small tree	tap, heart	perennial	2y	mid,late	full shade	moderate	monthly	must drain	tolerant	shallow	spike
kangkong	*Ipomoea aquatica*			running ground cover	fibrous	annual	2m	early	part shade	delicate	weekly	always wet	tolerant	shallow	
lab lab	*Lablab purpureus*	1m	2m	vine	heart	self-seeding	6m	middle	part shade	hardy	bi-monthly	seasonal wet	rich	medium	

Guide to table

Use this table to quickly cross-check plant attributes. The first columns help identify the plant and its typical form. The last columns show what each plant needs if it is to achieve optimum growth and health.

Height|Width: approx dimensions of a healthy plant in suitable conditions, when mature.

Form: describes the general shape of the plant; useful for creating layers and structural diversity.

Root Pattern: Flat=Mostly shallow roots forming a plate near the soil surface. May also develop vertical 'sinkers' or 'strikers' in various places. **Fibrous**=Dividing into a large number of fine roots immediately upon leaving the crown. **Heart**=Dividing from the crown into a number of main roots that both angle down-ward and spread outward. **Taproot**=Carrotlike roots (sometimes branching) driving directly downward.

HAZARD: Sap=sticky, irritating fluid from the plant's leaves, branches, roots, or fruit. Spike=hard, thorny projections





Common name	Species Name	Height	Width	Form	Root pattern	Lifecycle	Time to Harvest	Succession	Shade tolerance	Wind tolerance	Minimum watering	Drainage tolerance	Soil quality required	Soil depth required	HAZARD
ladyapple	*Syszgium suborbiculare*	3m	2m	small tree	taproot	perennial	4y	middle	full sun	hardy	bi-monthly	must drain	poor	deep	
lemon	*Citrus x limon*	3-4m	3m	small tree	tap, heart	perennial	2y	middle	full sun	moderate	monthly	must drain	tolerant	deep	spike
lemongrass	*Cymbopogon citratus*	1m	30cm	clumping	fibrous	suckering	1y	early	full sun	hardy	monthly	seasonal wet	rich	shallow	
long beans	*V. unguiculata spp sesqipedalis*			vine	heart	annual	5m	early	full shade	delicate	weekly	seasonal wet	tolerant	medium	
macadamia nut	*M. integrifolia and tetraphylla*	4-5m	4m	small tree	tap, heart	perennial	2y	middle	full sun	moderate	monthly	seasonal wet	tolerant	deep	spike
mandarin	*Citrus reticulata*	3-4m	3m	small tree	tap, heart	perennial	2y	middle	full sun	delicate	monthly	must drain	tolerant	deep	spike
mango	*Mangifera indica*	6m	6m	large tree	taproot	perennial	3y	middle	full sun	hardy	bi-monthly	must drain	tolerant	deep	sap
native Guava	*Eupomatia laurina*	2-4m	2-3m	small tree	taproot	perennial	3y	middle	part shade	moderate	bi-monthly	seasonal wet	rich	deep	
papaw	*Carica papaya*	2-3m	2m	small tree	tap, heart	perennial	10m	early	full sun	delicate	weekly	must drain	tolerant	deep	sap
parsley	*Petroselinum spp.*	30cm	20cm	shrub,clumping ground cover	taproot	annual	3m	early	part shade	moderate	weekly	must drain	rich	medium	
passionfruit	*Passiflora edulis*			vine	tap, heart	perennial	8m	early	part shade	delicate	weekly	must drain	tolerant	medium	
perennial coriander	*Eryngium foetidum*	30cm	40cm	shrub,clumping ground cover	taproot	self-seeding	3m	early	part shade	moderate	weekly	seasonal wet	rich	shallow	
pineapple	*Ananas comosus*	50cm	50cm	clumping ground cover	fibrous	suckering	1y	early	full sun	moderate	bi-monthly	must drain	tolerant	shallow	spike
Queensland arrowroot	*Canna edulis*	1-2m	1m	clumping	fibrous	suckering	1y	early	part shade	delicate	weekly	seasonal wet	tolerant	medium	
rosemary	*Rosemarinus officinalis*	30cm	50cm	shrub	tap, fibrous	perennial	6m	early,mid	sun and shade	moderate	bi-monthly	must drain	poor	shallow	
sapodilla	*Manilkara zapota*	4m	4m	small tree	taproot	perennial	3y	middle	full sun	moderate	bi-monthly	must drain	poor	deep	sap
sugar apple	*Annona squamosa*	2-3m	2m	small tree	tap, heart	perennial	2y	middle	full sun	delicate	monthly	must drain	tolerant	medium	
sweet leaf	*Sauropus androgynus*	3m	2m	shrub	heart	perennial	2y	middle	part shade	delicate	weekly	seasonal wet	rich	deep	
sweet orange	*Citrus x sinensis*	3-4m	3m	small tree	tap, heart	perennial	2y	middle	full sun	moderate	monthly	must drain	tolerant	deep	spike
sweet potato	*Ipomoea batatus*			running ground cover,vine	flat	annual	8m	early	sun and shade	hardy	bi-monthly	must drain	rich	medium	
Tahitian lime	*Citrus x latifolia*	3m	3m	small tree	heart	perennial	2y	middle	full sun	delicate	monthly	must drain	tolerant	deep	spike
tannia	*Xanthosoma sagittifolium*	1-2m	2m	clumping	fibrous	suckering	1y	early	part shade	moderate	monthly	seasonal wet	tolerant	medium	sap
taro	*Colocasia esculenta*	1-2m	2m	clumping	fibrous	suckering	10m	early	part shade	delicate	weekly	always wet	rich	medium	sap
tumeric	*Curcumba longa*	1m	30cm	clumping	fibrous	suckering	1y	early,mid	full shade	delicate	monthly	must drain	tolerant	medium	
watermelon	*Citrullus lanatus*			running ground cover	flat	annual	6m	early	full sun	moderate	weekly	must drain	rich	medium	
winged beans	*Psophocarpus tetragonolobus*			vine	heart	annual	4m	early	part shade	delicate	weekly	seasonal wet	tolerant	medium	
yam	*Dioscorea spp.*			vine,running ground cover	fibrous	annual	10m	early	full sun	delicate	weekly	must drain	rich	deep	

Life cycle: **Annual**=plant dies each year and must be re-sown. **Biennial**=plant dies every 2 years. **Perennial**=plant is long-lived. Suckering=plant continues to grow through suckers. **Self-seeding**=plant throws sufficient seed to not require manual planting.

Time to harvest: Use this to gauge how long before the landscape bears rewards.

Succession: Helps understand where the plant is best suited on the timeline. Fresh gardens should favour plants with Early succession values.

Sun & **Shade tolerance:** describes the plant's ability to deal with sun or shade. **Full sun**=tough enough to withstand blasting sun. **Part shade**=prefers a bit of cover. **Full shade**=will thrive best in low light (eg under full canopy)

Wind tolerance: how well can the plant handle strong prevailing winds? This will tell us how much shelter it needs, and it can suggest that a plant may be suitable for a wind break (wind reduction)

Minimum watering: describes the plant's capacity to survive the Dry . Use the values to plan out an irrigation routine so watering is kept to a low-maintenance minimum. During the Dry, **Bi-monthly**=water the plant every two months. **Monthly**=water the plant once a month. **Weekly**=water the plant once a week.

Drainage tolerance: how well will the plant handle seasonal downpours and soil waterlogging (impeded drainage)? Some plants need **good drainage** year-round, others will tolerate a **seasonal wet** period, and others need **wet** conditions most of the year (they are good for soaking up dripping eaves, laundry overflow, etc).

Soil quality: Some plants need rich soil, while others will tolerate less quality. The tough plants can grow even in poor soils.

Soil depth: General guide to how deep the soil needs to be. This is useful for design and layout in patches that have different soil depths.

Edible Plant Table: Species Benefits & Services

Common name	Nitrogen fixer	Nutrient accumulator	Biomass accumulator	Decompacts soil	Provides shade	Fast growing	Windbreak	Colourful Flowers	Wildlife support	Good Bugs	Weed suppression
acerola				Decompactor	Heavy Shade		Windbreak	Flowers	Food and shelter	Food and shelter	
aibika				Decompactor		Fast growing				Shelter	
amaranth		Nutrients	Biomass	Decompactor		Fast growing		Flowers		Shelter	
arrowroot		Nutrients				Fast growing				Shelter	Weed stopper
banana		Nutrients	Biomass		Heavy Shade	Fast growing			Food and shelter	Food	Weed stopper
basil						Fast growing		Flowers		Food and shelter	
beach almond		Nutrients	Biomass	Decompactor	Heavy Shade		Windbreak		Food and shelter	Food and shelter	
beach cherry					Heavy Shade		Windbreak		Food and shelter	Food and shelter	
Brazilian spinach						Fast growing				Food and shelter	Weed stopper
bullocks heart custard apple					Light Shade				Food and shelter		
carambola			Biomass	Decompactor	Heavy Shade	Fast growing		Flowers	Food and shelter	Food and shelter	
cassava			Biomass			Fast growing					
Ceylon spinach					Heavy Shade	Fast growing				Food and shelter	
cherry tomato				Decompactor		Fast growing					
chilli						Fast growing					
chives						Fast growing				Food and shelter	
coconut			Biomass	Decompactor	Light Shade	Fast growing	Windbreak	Flowers	Food and shelter	Food and shelter	
corn			Biomass			Fast growing	Windbreak	Flowers		Food and shelter	Weed stopper
cow pea	Nitrogen	Nutrients	Biomass	Decompactor		Fast growing				Shelter	Weed stopper
drumstick tree	Nitrogen	Nutrients	Biomass	Decompactor	Light Shade		Windbreak	Flowers	Food and shelter		
eggplant				Decompactor		Fast growing				Shelter	
galangal			Biomass			Fast growing	Windbreak	Flowers	Food and shelter	Shelter	Weed stopper
ginger						Fast growing				Shelter	
Japanese pumpkin						Fast growing		Flowers		Food and shelter	
kaffir lime									Food and shelter	Shelter	
kangkong		Nutrients				Fast growing		Flowers		Shelter	
lab lab	Nitrogen	Nutrients	Biomass	Decompactor		Fast growing		Flowers		Shelter	Weed stopper

Guide to table

Use this table to quickly cross-check plant attributes in relation to what ecological functions the plant provides. The first columns relate to building healthy soil. The last columns relate to structural and biodiversity benefits the plant can provide.

Nitrogen fixer: has bacteria in roots collecting nitrogen from the atmosphere making it available to its host plant and other plants when all or some of the host plant dies.

Nutrient accumulator: these plants are particularly good at mining nutrients from deep down in the soil, increasing the availability of these nutrients for themselves and neighbouring plants.

Biomass accumulator: these plants are excellent at creating bulk plant material which then becomes available as mulch.

Common name	Nitrogen fixer	Nutrient accumulator	Biomass accumulator	Decompacts soil	Provides shade	Fast growing	Windbreak	Colourful Flowers	Wildlife support	Good Bugs	Weed suppression
ladyapple				Decompactor	Light Shade					Food and shelter	
lemon					Light Shade					Food and shelter	
lemongrass						Fast growing					
long beans	Nitrogen	Nutrients	Biomass			Fast growing	Windbreak	Flowers		Shelter	Weed stopper
macadamia nut					Heavy Shade		Windbreak		Food and shelter	Food and shelter	
mandarin					Light Shade			Flowers	Food and shelter	Food and shelter	
mango			Biomass	Decompactor	Heavy Shade			Flowers		Food and shelter	
native Guava		Nutrients		Decompactor	Heavy Shade		Windbreak		Food and shelter		Weed stopper
papaw			Biomass		Light Shade	Fast growing				Food and shelter	
parsley						Fast growing	Windbreak	Flowers	Food and shelter	Food and shelter	Weed stopper
passionfruit					Heavy Shade	Fast growing	Windbreak	Flowers	Food and shelter	Food and shelter	
perennial coriander						Fast growing				Food and shelter	
pineapple						Fast growing	Windbreak	Flowers	Food and shelter	Food and shelter	
Queensland arrowroot		Nutrients	Biomass			Fast growing			Food and shelter		Weed stopper
rosemary									Food and shelter	Food and shelter	
sapodilla				Decompactor	Light Shade			Flowers	Food and shelter	Food and shelter	
sugar apple								Flowers		Food and shelter	
sweet leaf				Decompactor				Flowers		Shelter	
sweet orange					Light Shade		Windbreak	Flowers	Food and shelter	Food and shelter	
sweet potato						Fast growing				Shelter	Weed stopper
Tahitian lime					Light Shade			Flowers	Food and shelter	Food and shelter	
tannia						Fast growing				Shelter	Weed stopper
taro						Fast growing					Weed stopper
tumeric						Fast growing		Flowers		Food and shelter	
watermelon						Fast growing	Windbreak		Food and shelter	Food and shelter	
winged beans	Nitrogen	Nutrients	Biomass			Fast growing	Windbreak	Flowers		Food and shelter	
yam						Fast growing				Shelter	

Decompactors: vigorous, deep-rooted plants that drill into tough soils, opening them up for drainage and other plants.

Flowers: these plants have especially lovely flowers, which can satisfy aesthetic goals.

Biodiversity-Wildlife: these plants provide food and shelter for birds and other small animals.

Biodiversity-Good Bugs: plant provides nectar, pollen and shelter for beneficial insects.

Weed suppression: these plants help stop weeds through either providing dense ground covers or dense shade, because shading reduces weeds as well.

Ecological Functions Plant Table: Species Requirements

Common name	Species Name	Variety	Height	Width	Form	Lifecycle	Succession	Sun and Shade	Wind tolerance	Minimum watering	Drainage tolerance	Soil quality required	Soil depth required
Black Mulberry	*Morus nigra*	Hicks	5	3	large tree	perennial	early, mid	full sun		bi-monthly		tolerant	deep
Cassia	*Cassia bicapularis*		4		shrub	perennial	early, mid	full sun	moderate				
Coast Sheoak	*Casuarina equisfolia*		10		large tree	perennial	early, mid	full sun	delicate	bi-monthly	seasonal wet	poor	medium
Easter Cassia	*Cassia queenslandica*		12	10	large tree	perennial	early, mid	full sun	moderate		seasonal wet	poor	deep
Gliricidia	*Gliricidae sepium*		10	2	small tree	perennial	early	full sun	delicate	bi-monthly	seasonal wet	poor	deep
Golden Shower	*Cassia fistula*				small tree	perennial	early	full sun	moderate	bi-monthly	seasonal wet		deep
Green leaf desmodium	*Desmodium intortum*		0.5		running ground cover	perennial	early, mid	full shade	moderate	monthly	seasonal wet	tolerant	shallow
Hong Kong Orchid (Butterfly Tree)	*Bauhinia blakeana*	Sterile hybrid	9	6	large tree + D	perennial	early, mid	full sun	moderate	bi-monthly	must drain	tolerant	deep
Ice Cream Bean	*Inga edulis*		18	6	large arching Tree	perennial	early, mid		delicate	bi-monthly		tolerant	deep
Indian Kachnar	*Bauhinia variegata*	Sterile hybrid	10	6	large tree + D	perennial	early, mid	full sun	hardy	bi-monthly	must drain	tolerant	deep
Inga Coxal	*Inga coxal*		5		small tree	perennial	early	full sun		bi-monthly			shallow
Lebbeck	*Albizia Lebbeck*		30	20	large arching Tree	perennial	early, mid	full sun	moderate	bi-monthly	seasonal wet	tolerant	medium
Lillypilly	*Syzygium australe*	resilience	2	2	small tree	perennial	early, mid	full sun	delicate	bi-monthly	must drain	poor	medium
Milletia	*Pongamia*		20		large tree	perennial	early	full sun	moderate	bi-monthly	seasonal wet	poor	deep
Neem tree	*Azadirachta indica*		15–20	15–20	large tree	perennial	early, mid	full sun	moderate	bi-monthly	must drain	poor	deep
Orange Jessamine	*Murraya paniculata*		7	1	shrub	perennial	early, mid	full sun	hardy	bi-monthly	seasonal wet	tolerant	deep
Pigeon Pea	*Cajanus cajan*	Seeds - weed?	2	2	shrub	perennial	early	part shade	moderate	bi-monthly	seasonal wet	poor	shallow
Pink Poodle	*Calliandra surinamensis*		3	3	small tree	perennial			delicate	bi-monthly			
Pink Shower	*Cassia javanica*		25		large tree + D	perennial	early, mid	full sun	moderate		seasonal wet	tolerant	deep
Pintos peanut	*Arachis pintoi*	Orange and yellow var.	30cm		clumping ground cover	perennial	early, mid	part shade	hardy	bi-monthly	seasonal wet	poor	shallow
Poinciana	*Delonix regia*		5	>5	large arching Tree	perennial	early, mid	full sun	moderate	bi-monthly	seasonal wet	tolerant	medium
Rain Tree	*Albizia saman*		15	40	large arching Tree	perennial	early, mid	full sun	hardy	bi-monthly	seasonal wet	poor	deep
Red Caliandra	*Calliandra calothyrsus*		12		small tree	perennial	early, mid	full sun	moderate	bi-monthly		poor	
Red Mulberry	*Morus rubra*				large tree	perennial	early, mid	full sun		bi-monthly		tolerant	deep
Red Powder Puff	*Calliandra surinamensis*		5	8	small tree	perennial	early, mid	full sun	moderate		must drain	poor	deep
Rhizome peanut	*Arachis glabrata*		50cm		clumping ground cover	annual	early, mid	full sun	moderate			tolerant	shallow
Rosewood	*Tibuana tipu*		10	>10	large arching Tree	perennial	early, mid	full sun	moderate	bi-monthly	seasonal wet	tolerant	medium
Sesbania	*Sesbania grandifolia*				small tree	perennial	early	full sun	moderate	bi-monthly		poor	deep
Sorghum	*Sorghum vulgare*	Sugardrip	2	1	large grass	self-seeding	early	full sun	moderate	bi-monthly	seasonal wet	poor	shallow
Stylo	*Stylosanthes guianensis*				clumping ground cover	perennial	early, mid	part shade	moderate	bi-monthly	seasonal wet	poor	shallow
Swamp Sheoak	*Casuarina glauca*		10		large tree	perennial	early, mid			bi-monthly	seasonal wet	poor	medium
Tamarind	*Tamarindus indica*	Sweet Tamarind	18		large tree	perennial	early, mid	full sun	delicate	bi-monthly		poor	deep
Whte Mulberry	*Morus alba*				large tree	perennial	early, mid	full sun		bi-monthly		tolerant	deep
Wynne Cassia	*Wynne cassia*		0.5		clumping ground cover	perennial	early, mid	full sun	delicate	bi-monthly	seasonal wet	poor	shallow

Ecological Functions Plant Table: Species Benefits & Services

Common name	Nitrogen fixer	Nutrient accumulator	Biomass accumulator	Decompacts soil	Provides shade	Fast growing	Windbreak	Colourful Flowers	Wildlife support	Good Bugs	Weed suppression
Black Mulberry			Biomass		Heavy Shade	Fast growing					Weed stopper
Cassia	Nitrogen			Decompactor	Heavy Shade		Windbreak	Flowers	Food and Shelter	Food and Shelter	
Coast Sheoak	Nitrogen				Light Shade	Fast growing	Windbreak				
Easter Cassia	Nitrogen		Biomass		Heavy Shade	Fast growing					Weed stopper
Gliricidia	Nitrogen		Biomass		Light Shade	Fast growing	Windbreak	Flowers			Weed stopper
Golden Shower	Nitrogen		Biomass		Heavy Shade	Fast growing	Windbreak	Flowers		Shelter	Weed stopper
Green leaf desmodium	Nitrogen		Biomass	Decompactor	Light Shade	Fast growing					Weed stopper
Hong Kong Orchid (Butterfly Tree)		Nutrients	Biomass	Decompactor		Fast growing		Flowers		Shelter	
Ice Cream Bean	Nitrogen		Biomass		Heavy Shade	Fast growing		Flowers			Weed stopper
Indian Kachnar				Decompactor		Fast growing		Flowers		Shelter	
Inga Coxal	Nitrogen		Biomass		Heavy Shade	Fast growing		Flowers			Weed stopper
Lebbeck	Nitrogen		Biomass		Light Shade	Fast growing					
Lillypilly					Light Shade	Fast growing					Weed stopper
Milletia	Nitrogen				Heavy Shade						
Neem tree	Nitrogen		Biomass		Heavy Shade	Fast growing				Shelter	Weed stopper
Orange Jessamine					Light Shade	Fast growing	Windbreak	Flowers			Weed stopper
Pigeon Pea	Nitrogen			Decompactor	Light Shade	Fast growing				Shelter	Weed stopper
Pink Poodle	Nitrogen				Light Shade	Fast growing	Windbreak	Flowers	Food and Shelter	Food and Shelter	
Pink Shower	Nitrogen		Biomass		Heavy Shade	Fast growing				Food and Shelter	Weed stopper
Pintos peanut	Nitrogen							Flowers		Shelter	
Poinciana	Nitrogen		Biomass		Light Shade	Fast growing					Weed stopper
Rain Tree	Nitrogen		Biomass		Heavy Shade	Fast growing		Flowers			Weed stopper
Red Caliandra	Nitrogen				Heavy Shade			Flowers	Food and Shelter	Food and Shelter	Weed stopper
Red Mulberry			Biomass		Heavy Shade	Fast growing					Weed stopper
Red Powder Puff	Nitrogen							Flowers			
Rhizome peanut	Nitrogen	Nutrients		Decompactor	Heavy Shade				Food and Shelter		Weed stopper
Rosewood	Nitrogen		Biomass		Light Shade	Fast growing					Weed stopper
Sesbania			Biomass		Light Shade	Fast growing					
Sorghum	Nitrogen	Nutrients	Biomass			Fast growing					Weed stopper
Stylo					Light Shade						Weed stopper
Swamp Sheoak	Nitrogen				Light Shade	Fast growing	Windbreak				
Tamarind	Nitrogen		Biomass		Light Shade		Windbreak		Food and Shelter		
Whte Mulberry			Biomass		Heavy Shade	Fast growing					Weed stopper
Wynne Cassia	Nitrogen		Biomass		Light Shade	Fast growing					Weed stopper

Plant	Root Depth	Minimum Soil quality	Minimum Water
cherry tomato	shallow	rich	weekly
kaffir lime	shallow	rich	weekly
pineapple	shallow	rich	weekly
basil	shallow	tolerant	daily
chives	shallow	tolerant	weekly
lemongrass	shallow	tolerant	weekly
rosemary	shallow	poor	weekly
amaranth	medium	rich	weekly
banana	medium	rich	daily
beach cherry	medium	rich	weekly
chilli	medium	rich	weekly
corn	medium	rich	daily
eggplant	medium	rich	daily
ginger	medium	rich	daily
long beans	medium	rich	daily
passionfruit	medium	rich	daily
sugar apple	medium	rich	daily
tumeric	medium	rich	daily
winged beans	medium	rich	daily
Japanese pumpkin	medium	tolerant	daily
parsley	medium	tolerant	daily
sweet potato	medium	tolerant	weekly
watermelon	medium	tolerant	daily
cassava	medium	poor	months
galangal	medium	poor	months
carambola	deep	rich	daily
coconut	deep	rich	weekly
lemon	deep	rich	weekly
macadamia nut	deep	rich	weekly
mandarin	deep	rich	weekly
papaw	deep	rich	daily
sweet orange	deep	rich	weekly
Tahitian lime	deep	rich	weekly
bullocks heart custard apple	deep	tolerant	daily
mango	deep	tolerant	weekly
yam	deep	tolerant	daily
acerola	deep	poor	daily
beach almond	deep	poor	weekly
drumstick tree	deep	poor	months
ladyapple	deep	poor	months
sapodilla	deep	poor	weekly
Brazilian spinach	shallow	rich	weekly
kangkong	shallow	rich	daily
Ceylon spinach	shallow	tolerant	daily
perennial coriander	shallow	tolerant	daily
aibika	medium	rich	weekly
arrowroot	medium	rich	weekly
cow pea	medium	rich	weekly

SOILS: Drainage, Depth, quality, and irrigation

The columns here are sorted first on drainage (species requiring good drainage are on top) and then by soil depth.

This table can be used to quickly locate species that can tolerate wet (or seasonally impeded) drainage, and shows the other requirements they may have.

Plant information cards

The pages following show a bit of key information summarised for each plant, focussing on the environmental conditions that it needs to optimum health.

As you start to broaden your plant species palette, recording information like this will help plan the best arrangement of species to promote ecological vigour.

ACEROLA

Malpighia emarginata

Limited selections.

Height	2m	shrub
Width	2m	

Plant potted plant.

Maintain weed/grass free till established. May need height and branch pruning

Sun Tolerance	Wind Tolerance	Min Water
part shade	delicate	bi-monthly

Drainage	Soil needs	Root depth
seasonal wet	poor	deep

AIBIKA

Bele, Pele, Slippery,Pacific cabbage

Abelmoschus manihot

Numerous selections with various leaf sizes and shapes, stem colours, leaf textures and flavours.

Height	2m	shrub
Width	2m	

Plant branch cuttings with 2 nodes exposed or potted plants.

Maintain weed/grass free by mulching. Needs regular watering.

Sun Tolerance	Wind Tolerance	Min Water
part shade	delicate	weekly

Drainage	Soil needs	Root depth
seasonal wet	tolerant	medium

AMARANTH

Moca, Bhaji

Amaranthus spp.

Numerous selections and types. Selected for leaf, seed production and ornamental value. Green, small leaf and small seed head types are weeds.

Height	50cm	clumping ground cover
Width	40 cm	

Plant potted plant or seeds scattered and lightly covered with compost.

Maintain weed/grass free.

Sun Tolerance	Wind Tolerance	Min Water
sun and shade	delicate	weekly

Drainage	Soil needs	Root depth
seasonal wet	tolerant	medium

ARROWROOT

Maranta arundinacea

Limited selections

Height	50-75cm	clumping
Width		

Plant suckers or potted plants 15cm deep.

Weed free till established.

Sun Tolerance	Wind Tolerance	Min Water
part shade	delicate	weekly

Drainage	Soil needs	Root depth
seasonal wet	tolerant	medium

BANANA

Plantain, Cavendish, Ducasse

Musa spp.

Numerous named varieties for cooking and sweet eating

Height	2-3 m	clumping,small tree
Width	2 m	

Plant butt of sucker 30cm deep or piece of corm 10cm.

Cut off dying leaves and excess suckers. Maintain free of weeds, particularly grass.

Sun Tolerance	Wind Tolerance	Min Water
full sun	delicate	monthly

Drainage	Soil needs	Root depth
must drain	tolerant	medium

BASIL

Sweet basil

Ocimum basilicum

Numerous named types but sweet basil is the most common

Height	1m	shrub
Width	60cm	

Plant seeds or seedlings and lightly mulch.

Weed free till established.

Sun Tolerance	Wind Tolerance	Min Water
part shade	delicate	weekly

Drainage	Soil needs	Root depth
seasonal wet	rich	shallow

BEACH ALMOND

Terminalia catappa

Bush selections.

Height	4-6m	large tree
Width	4-6m	

Plant potted plant.

Maintain weed/grass free till established. May need height pruning.

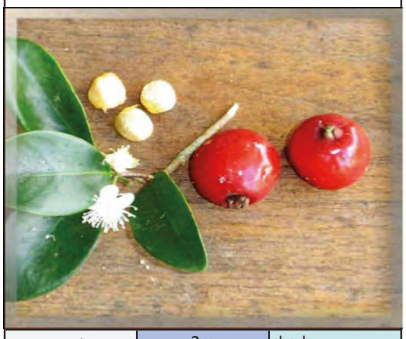
Sun Tolerance	Wind Tolerance	Min Water
full sun	hardy	bi-monthly

Drainage	Soil needs	Root depth
must drain	poor	deep

BEACH CHERRY

Eugenia reinwardtiana

Bush selections.



Height	2m	shrub
Width	2m	

Just spread the seeds. Don't need to dig.

Cut back excess growth.

Sun Tolerance	Wind Tolerance	Min Water
full sun	delicate	monthly

Drainage	Soil needs	Root depth
must drain	tolerant	medium

BRAZILIAN SPINACH

Alternanthera sissoo

Limited selections with purple and green stem types.

Height	50cm	clumping ground cover
Width		

Plant branch cuttings with 2 nodes exposed or potted plants.

Excess growth can be trimmed.

Sun Tolerance	Wind Tolerance	Min Water
part shade	moderate	monthly

Drainage	Soil needs	Root depth
seasonal wet	tolerant	shallow

BULLOCK'S HEART CUSTARD APPLE

Annona reticulata

Limited selections.

Height	3-4m	small tree
Width	3m	

Plant potted plant.

Maintain weed/grass free till established. May need height pruning.

Sun Tolerance	Wind Tolerance	Min Water
full sun	delicate	monthly

Drainage	Soil needs	Root depth
must drain	rich	deep

CARAMBOLA

Five corner

Averrhoa carambola

Various selections based on fruit colour, size and flavour.

Height	4m	small tree
Width	4m	

Plant potted plant.

Maintain weed/grass free till established. May need height and branch pruning.

Sun Tolerance	Wind Tolerance	Min Water
full sun	delicate	monthly

Drainage	Soil needs	Root depth
seasonal wet	tolerant	deep

CASSAVA

Tapioca, Manihot

Manihot esculenta

Yellow and white types of sweet cassava are available. Avoid bitter types.

Height	2-3m	shrub
Width	3m	

Plant branch cuttings with 2 nodes exposed.

Maintain weed/grass free.

Sun Tolerance	Wind Tolerance	Min Water
full sun	moderate	bi-monthly

Drainage	Soil needs	Root depth
seasonal wet	poor	medium

CEYLON SPINACH

Malabar greens, Indian spinach

Basella alba

Purple and green subspecies with limited selections.

Height		vine, running ground cover
Width		

Plant potted plant or seeds on surface and lightly mulch.

Can benefit from support structure.

Sun Tolerance	Wind Tolerance	Min Water
part shade	delicate	weekly

Drainage	Soil needs	Root depth
seasonal wet	rich	shallow

CHERRY TOMATO

Tom thumb

Solanum lycopersicum var. cerasiforme

Various selections and named varieties.

Height	60cm	vine,running ground cover
Width	50 cm	

Will self seed or you can direct seed in the garden, or grow in pots.

May benefit from support structure.

Sun Tolerance	Wind Tolerance	Min Water
full sun	delicate	bi-monthly

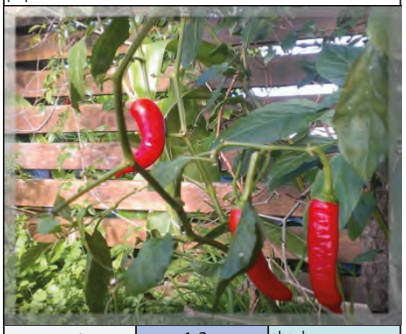
Drainage	Soil needs	Root depth
must drain	tolerant	shallow

CHILLI

Hot peppers, Chilli peppers

Capsicum frutescens

Numerous selections but the small fruited birdseye is popular.



Height	1-2m	shrub
Width	1m	

Plant potted plant in loose soil and lightly mulch or scatter seeds.

Weed free till established.

Sun Tolerance	Wind Tolerance	Min Water
part shade	moderate	monthly

Drainage	Soil needs	Root depth
must drain	tolerant	medium

CHIVES

Chives, Garlic chives

Allium schoenoprasum

Various types but flatleaf garlic (A. tuberosum) is most resiliant.

Height	30cm	clumping ground cover
Width	3cm	

Plant potted plant in loose soil and lightly mulch

Weed free till established.

Sun Tolerance	Wind Tolerance	Min Water
sun and shade	moderate	weekly

Drainage	Soil needs	Root depth
seasonal wet	rich	shallow

COCONUT

Cocos nucifera

Super dwarf, dwarf and tall selections.

Height	3-25m	small tree,large tree
Width	4-8m	

Plant seeds or seedlings and lightly mulch

Weed free till established.

Sun Tolerance	Wind Tolerance	Min Water
full sun	hardy	bi-monthly

Drainage	Soil needs	Root depth
seasonal wet	tolerant	deep

CORN

sweet corn, maize

Zea mays

Numerous selections with varying heights, cob colours and disease tolerances. Sweet corn may be available in open pollinated lines or sweeter hybrid lines.

Height		clumping
Width		

Plant seeds or seedlings and lightly mulch

Weed free till established.

Sun Tolerance	Wind Tolerance	Min Water
full sun	moderate	weekly

Drainage	Soil needs	Root depth
seasonal wet	tolerant	medium

COW PEA

Black eye bean, Long bean, Catjang

Vigna unguiculata

Various subspecies with numerous selections including long beans and black eye peas.

Height	30cm	running ground cover
Width	40 cm	

Just spread the seeds. Don't need to dig

Cut back excess growth.

Sun Tolerance	Wind Tolerance	Min Water
full sun	moderate	bi-monthly

Drainage	Soil needs	Root depth
seasonal wet	tolerant	medium

DRUMSTICK TREE

horseraddish tree, Moringa

Moringa oleifera

limited selections.

Height	6m	large tree
Width	4m	

Plant potted plant

May need occasional height and branch control by pruning.

Sun Tolerance	Wind Tolerance	Min Water
full sun	moderate	bi-monthly

Drainage	Soil needs	Root depth
must drain	poor	deep

EGGPLANT

Aubergine

Solanum melongena

Numerous varieties that range in fruit size, colour, shape, flavour and texture.

Height	1m	shrub
Width	1m	

Plant potted plant or graft onto wild eggplant.

Weed free till established. Grafted plants best.

Sun Tolerance	Wind Tolerance	Min Water
full sun	moderate	weekly

Drainage	Soil needs	Root depth
must drain	tolerant	medium

GALANGAL

Laos, Thai ginger, Greater galangal

Alpinia galangal

Limited selections but like ginger age and conditions will produce a variety of products.

Height	1-2m	clumping
Width	60cm	

Plant potted plant or setts and lightly mulch.

Weed free till established.

Sun Tolerance	Wind Tolerance	Min Water
full sun	hardy	bi-monthly

Drainage	Soil needs	Root depth
seasonal wet	poor	medium

GINGER

Zingiber officinale

Various selections and hybrids.

Height	1m	clumping
Width		

Plant setts or bits in loose soil, near the surface and mulch well.

Weed free till established.

Sun Tolerance	Wind Tolerance	Min Water
full shade	moderate	monthly

Drainage	Soil needs	Root depth
must drain	tolerant	medium

JAPANESE PUMPKIN

Gramma

Cucurbita moschata

Various shapes Bugle and Kents special are common types.

Height		running ground cover,vine
Width		

Plant seeds or seedlings and lightly mulch.

Weed free till established.

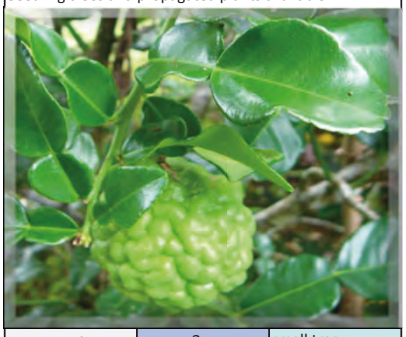
Sun Tolerance	Wind Tolerance	Min Water
sun and shade	moderate	weekly

Drainage	Soil needs	Root depth
must drain	rich	medium

KAFFIR LIME

Citrus hystrix

Seedling trees and propagated plants available.



Height	3m	small tree
Width	3m	

Plant potted plant.

Weed free till established.

Sun Tolerance	Wind Tolerance	Min Water
full shade	moderate	monthly

Drainage	Soil needs	Root depth
must drain	tolerant	shallow

KANGKONG

Water spinach, Swamp cabbage

Ipomoea aquatica

Two common subspecies wetland and garden.

Height		running ground cover
Width		

Plant branch cuttings with 2 nodes exposed or potted plants.

Excess growth can be trimmed. Needs regular watering.

Sun Tolerance	Wind Tolerance	Min Water
part shade	delicate	weekly

Drainage	Soil needs	Root depth
always wet	tolerant	shallow

LAB LAB

Poormans bean, Dolichos

Lablab purpureus

Various selections.

Height	1m	vine
Width	2m	

Just spread the seeds. Don't need to dig.

Cut and drop as mulch when plants get bigger as will smother small plants.

Sun Tolerance	Wind Tolerance	Min Water
part shade	hardy	bi-monthly

Drainage	Soil needs	Root depth
seasonal wet	rich	medium

LADYAPPLE

Syszgium suborbiculare

Bush selections.

Height	3m	small tree
Width	2m	

Plant potted plant.

Maintain weed/grass free till established. May need height pruning.

Sun Tolerance	Wind Tolerance	Min Water
full sun	hardy	bi-monthly

Drainage	Soil needs	Root depth
must drain	poor	deep

LEMON

Lisbon

Citrus x limon

Various varieties with Eureka being a popular variety for tropical areas.

Height	3-4m	small tree
Width	3m	

Plant potted plant.

Maintain weed/grass free till established. May need height and branch pruning.

Sun Tolerance	Wind Tolerance	Min Water
full sun	moderate	monthly

Drainage	Soil needs	Root depth
must drain	tolerant	deep

LEMONGRASS

Turtle grass

Cymbopogon citratus

Softer and hard selections and some native Australian species.

Height	1m	clumping
Width	30cm	

Plant suckers or potted plants 15cm deep.

Weed free till established. Cut back older plants to reshoot near base.

Sun Tolerance	Wind Tolerance	Min Water
full sun	hardy	monthly

Drainage	Soil needs	Root depth
seasonal wet	rich	shallow

LONG BEANS

Yardlong or Snake bean

Vigna unguiculata subsp sesqipedalis

Numerous selections.

Height		vine
Width		

Plant seeds or seedlings and lightly mulch.

Excess growth can be trimmed.

Sun Tolerance	Wind Tolerance	Min Water
full shade	delicate	weekly

Drainage	Soil needs	Root depth
seasonal wet	tolerant	medium

MACADAMIA NUT

Queensland ball, Bauple nut

Macadamia integrifolia and tetraphylla

Various selections and hybrids.

Height	4-5m	small tree
Width	4m	

Plant potted plant.

Maintain weed/grass free till established. May need height pruning.

Sun Tolerance	Wind Tolerance	Min Water
full sun	moderate	monthly

Drainage	Soil needs	Root depth
seasonal wet	tolerant	deep

MANDARIN

Citrus reticulata

Numerous varieties with Murcott, Imperial and Hickson worth trying.

Height	3-4m	small tree
Width	3m	

Plant suckers or potted plants 15cm deep.

Maintain weed/grass free till established. May need height and branch pruning.

Sun Tolerance	Wind Tolerance	Min Water
full sun	delicate	monthly

Drainage	Soil needs	Root depth
must drain	tolerant	deep

MANGO

Mangifera indica

Numerous selections and seedlings with various fruit sizes, colours, shapes, flavours and textures.

Height	6m	large tree
Width	6m	

Plant potted plant.

Maintain weed/grass free till established. May need height and branch pruning.

Sun Tolerance	Wind Tolerance	Min Water
full sun	hardy	bi-monthly

Drainage	Soil needs	Root depth
must drain	tolerant	deep

NATIVE GUAVA

Eupomatia laurina

Bush selections.

Height	2-4m	small tree
Width	2-3m	

Plant potted plant.

May need occasional height and branch control by pruning.

Sun Tolerance	Wind Tolerance	Min Water
part shade	moderate	bi-monthly

Drainage	Soil needs	Root depth
seasonal wet	rich	deep

PAPAW

Papaya, Pawpaw

Carica papaya

Numerous selections and varieties commonly grouped into red and yellow fleshed types.

Height	2-3m	small tree
Width	2m	

Plant potted plant or seeds on surface and lightly mulch.

Weed free till established. Cut back older plants to reshoot near base.

Sun Tolerance	Wind Tolerance	Min Water
full sun	delicate	weekly

Drainage	Soil needs	Root depth
must drain	tolerant	deep

PARSLEY

Italian parsley, Curled leaf parsley

Petroselinum spp.

Italian and Curled.

Height	30cm	clumping ground cover
Width	20cm	

Plant potted plant in loose soil and lightly mulch.
Weed free till established.

Sun Tolerance	Wind Tolerance	Min Water
part shade	moderate	weekly

Drainage	Soil needs	Root depth
must drain	rich	medium

PASSIONFRUIT

Passiflora edulis

Numerous types but commonly Yellow, Purple or Panama are available.

Height	2-4m	small tree
Width	2-3m	

Plant potted plant.
May need occasional height and branch control by pruning.

Sun Tolerance	Wind Tolerance	Min Water
part shade	moderate	bi-monthly

Drainage	Soil needs	Root depth
seasonal wet	rich	deep

PERENNIAL CORIANDER

Culantro, Mexican coriander

Eryngium foetidum

Limited selections.

Height	30cm	clumping ground cover
Width	40cm	

Plant potted plant.
Weed free till established.

Sun Tolerance	Wind Tolerance	Min Water
part shade	moderate	weekly

Drainage	Soil needs	Root depth
seasonal wet	rich	shallow

PINEAPPLE

Ananas comosus

Numerous selections and hybrids, Grouped basically as rough and smooth leaf types.

Height	50cm	clumping ground cover
Width	50cm	

Plant potted plant.
Weed free till established.

Sun Tolerance	Wind Tolerance	Min Water
full sun	moderate	bi-monthly

Drainage	Soil needs	Root depth
must drain	tolerant	shallow

QUEENSLAND ARROWROOT

Canna edulis

limited selections.

Height	1-2m	clumping
Width	1m	

Plant suckers or potted plants 15cm deep.
Weed free till established.

Sun Tolerance	Wind Tolerance	Min Water
part shade	delicate	weekly

Drainage	Soil needs	Root depth
seasonal wet	tolerant	medium

ROSEMARY

Rosemarinus officinalis

Numerous named selections. Various growth habits and flavor intensities.

Height	30cm	shrub
Width	50cm	

Plant potted plant.
Weed free till established.

Sun Tolerance	Wind Tolerance	Min Water
sun and shade	moderate	bi-monthly

Drainage	Soil needs	Root depth
must drain	poor	shallow

SAPODILLA

chico

Manilkara zapota

Various selections based on fruit size and texture

Height	4m	clumping ground cover
Width	4m	

Plant potted plant.

Maintain weed/grass free till established. May need height pruning.

Sun Tolerance	Wind Tolerance	Min Water
full sun	moderate	bi-monthly

Drainage	Soil needs	Root depth
must drain	poor	deep

SUGAR APPLE

Annona squamosa

Limited selections

Height	2-3m	small tree
Width	2m	

Plant potted plant.

Weed free till established.

Sun Tolerance	Wind Tolerance	Min Water
full sun	delicate	monthly

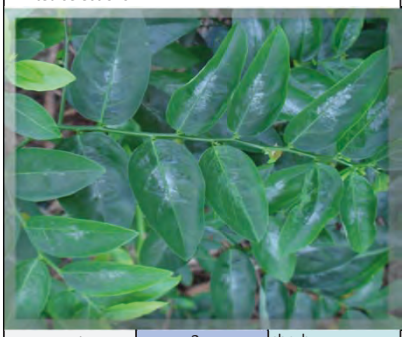
Drainage	Soil needs	Root depth
must drain	tolerant	medium

SWEET LEAF

Boneo, Katuk

Sauropus androgynus

Limited selections



Height	3m	shrub
Width	2m	

Plant branch cuttings with 2 nodes exposed or potted plants.

May need occasional height and branch control by pruning.

Sun Tolerance	Wind Tolerance	Min Water
part shade	delicate	weekly

Drainage	Soil needs	Root depth
seasonal wet	rich	deep

SWEET ORANGE

Citrus x sinensis

Various selections with Lanes late,valencia and seedless velencia worth planting in tropical areas.

Height	3-4m	small tree
Width	3m	

Plant potted plant.

Maintain weed/grass free till established. May need height and branch pruning.

Sun Tolerance	Wind Tolerance	Min Water
full sun	moderate	monthly

Drainage	Soil needs	Root depth
must drain	tolerant	deep

SWEET POTATO

Ipomoea batatus

Numerous selections based on plant growth, leaf shape, root shape, colour, size flavour and nutritional values.

Height		running ground cover,vine
Width		

Plant cuttings near surfacec and mulch well.

Excess growth can be trimmed.

Sun Tolerance	Wind Tolerance	Min Water
sun and shade	hardy	bi-monthly

Drainage	Soil needs	Root depth
must drain	rich	medium

TAHITIAN LIME

Mexican lime

Citrus x latifolia

One basic variety.

Height	3m	small tree
Width	3m	

Plant potted plant.

Maintain weed/grass free till established. May need height and branch pruning.

Sun Tolerance	Wind Tolerance	Min Water
full sun	delicate	monthly

Drainage	Soil needs	Root depth
must drain	tolerant	deep

TANNIA

cocoyam, taro palangi, eddoe

Xanthosoma sagittifolium

Limited selections with purple and green stem types.

Height	1-2m	clumping
Width	2m	

Plant suckers 30cm deep or tops, after drying cut surface, 30cm but fill in hole over time.

Weed free till established.

Sun Tolerance	Wind Tolerance	Min Water
part shade	moderate	monthly

Drainage	Soil needs	Root depth
seasonal wet	tolerant	medium

TARO

dasheen, talo, dalo

Colocasia esculenta

Bunlong is an Asian type but firmer Pacific types are available.

Height	1-2m	clumping
Width	1-2m	

Plant suckers 30cm deep or tops, after drying cut surface, 30cm but fill in hole over time.

Maintain weed/grass free by mulching. Needs regular watering.

Sun Tolerance	Wind Tolerance	Min Water
part shade	delicate	weekly

Drainage	Soil needs	Root depth
always wet	rich	medium

TUMERIC

Curcumba longa

Various selections range in colour from colorless to deep orange.

Height	1m	clumping
Width	30cm	

Plant potted plant or setts and lightly mulch.

Weed free till established. Plant in late spring.

Sun Tolerance	Wind Tolerance	Min Water
full shade	delicate	monthly

Drainage	Soil needs	Root depth
must drain	tolerant	medium

WATERMELON

Citrullus lanatus

Numerous varieties of yellow to red fleshed including open pollinated seeded and seedless hybrids.

Height		running ground cover
Width		

Plant seeds or seedlings and lightly mulch.

Weed free till established.

Sun Tolerance	Wind Tolerance	Min Water
full sun	moderate	weekly

Drainage	Soil needs	Root depth
must drain	rich	medium

WINGED BEANS

Psophocarpus tetragonolobus

Selections for beans and tubers. For fresh beans, purple and green types.

Height		vine
Width		

Plant seeds or seedlings and lightly mulch.

Weed free till established. Plant in late spring.

Sun Tolerance	Wind Tolerance	Min Water
part shade	delicate	weekly

Drainage	Soil needs	Root depth
seasonal wet	tolerant	medium

YAM

White yam

Dioscorea spp.

Height		vine,running ground cover
Width		

Plant setts or bits in loose soil, near the surface and mulch well.

Supply compost and maintain weed free.

Sun Tolerance	Wind Tolerance	Min Water
full sun	delicate	weekly

Drainage	Soil needs	Root depth
must drain	rich	deep

Stay in Touch

This version of the publication will be available at no cost as an electronic download from the Cook Shire Council for the foreseeable future.

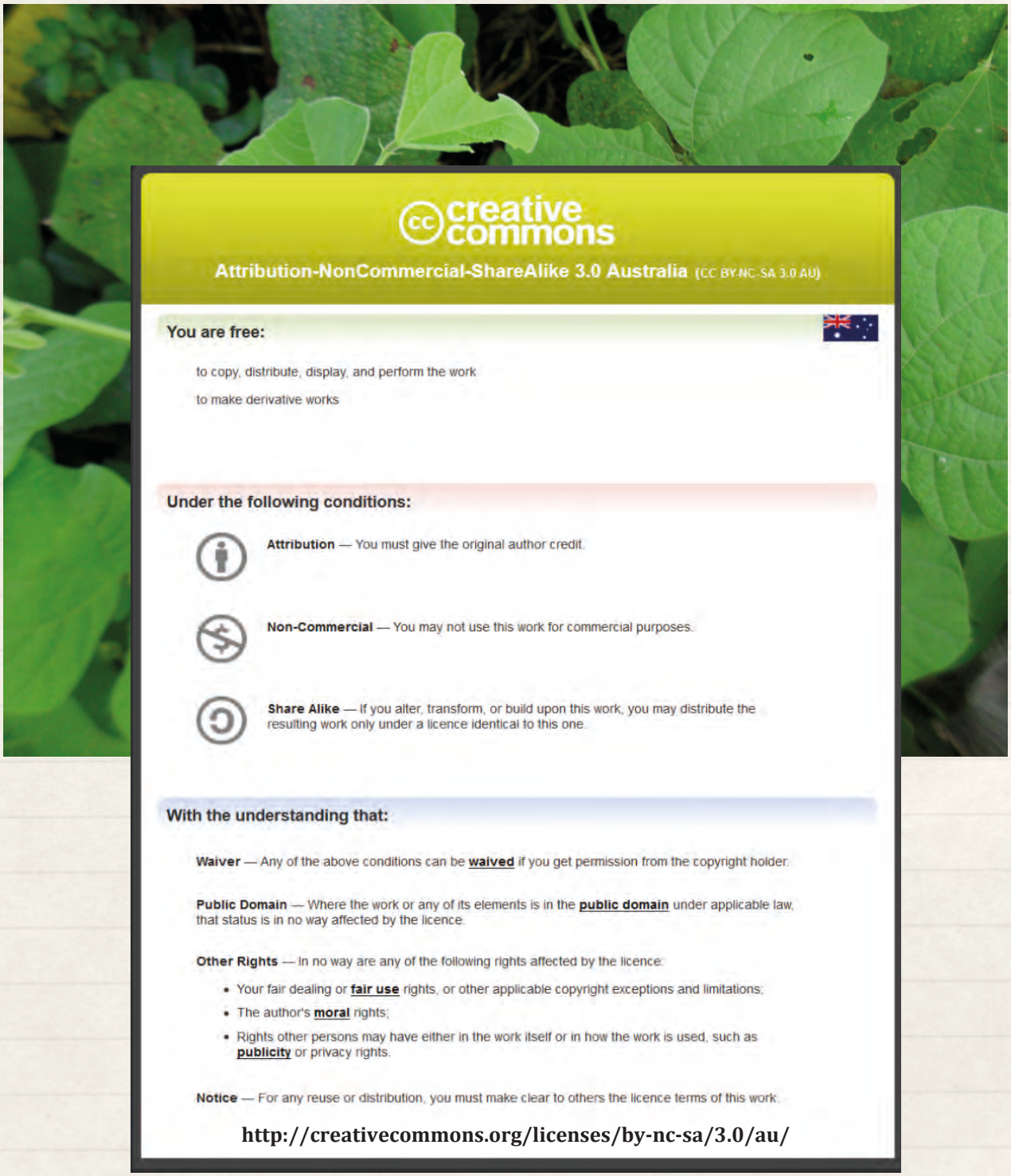
It is anticipated that the work will be transformed into an interactive website as well. This will allow users to register new plants a, post their edible ecosystem designs, and exchange hits and tips based on their experience. A likely home for the work is the Remote Indigenous Gardens Network, which serves the needs of gardeners across the tropical north of Australia.

To locate the current status of this work, web search for the "no-mower food grower" and follow the links.

Recipes for Living Well

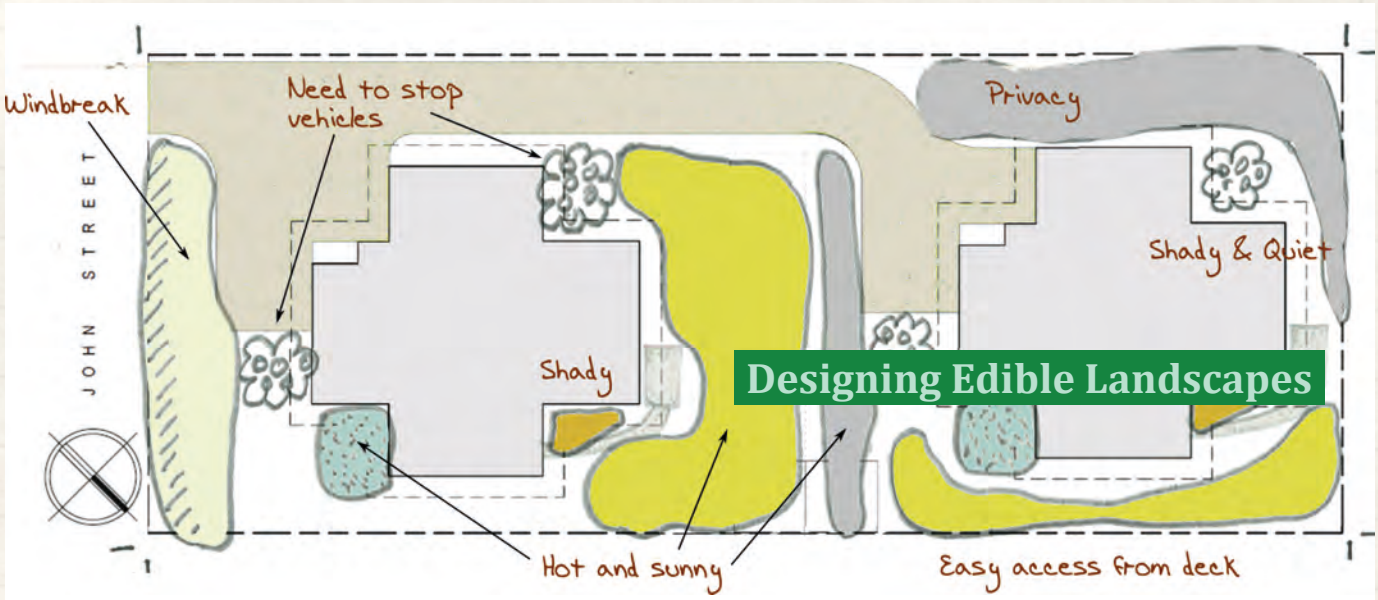
The recipes in this volume were developed by Clare Richards, who served as Coordinator of the Cooktown Healthy Communities program, 2012-2013. The recipes originally appeared in the local Cooktown newspaper under Clare's weekly column, *Living Well*.

For more information on the recipes, contact clare@clareskitchen.com



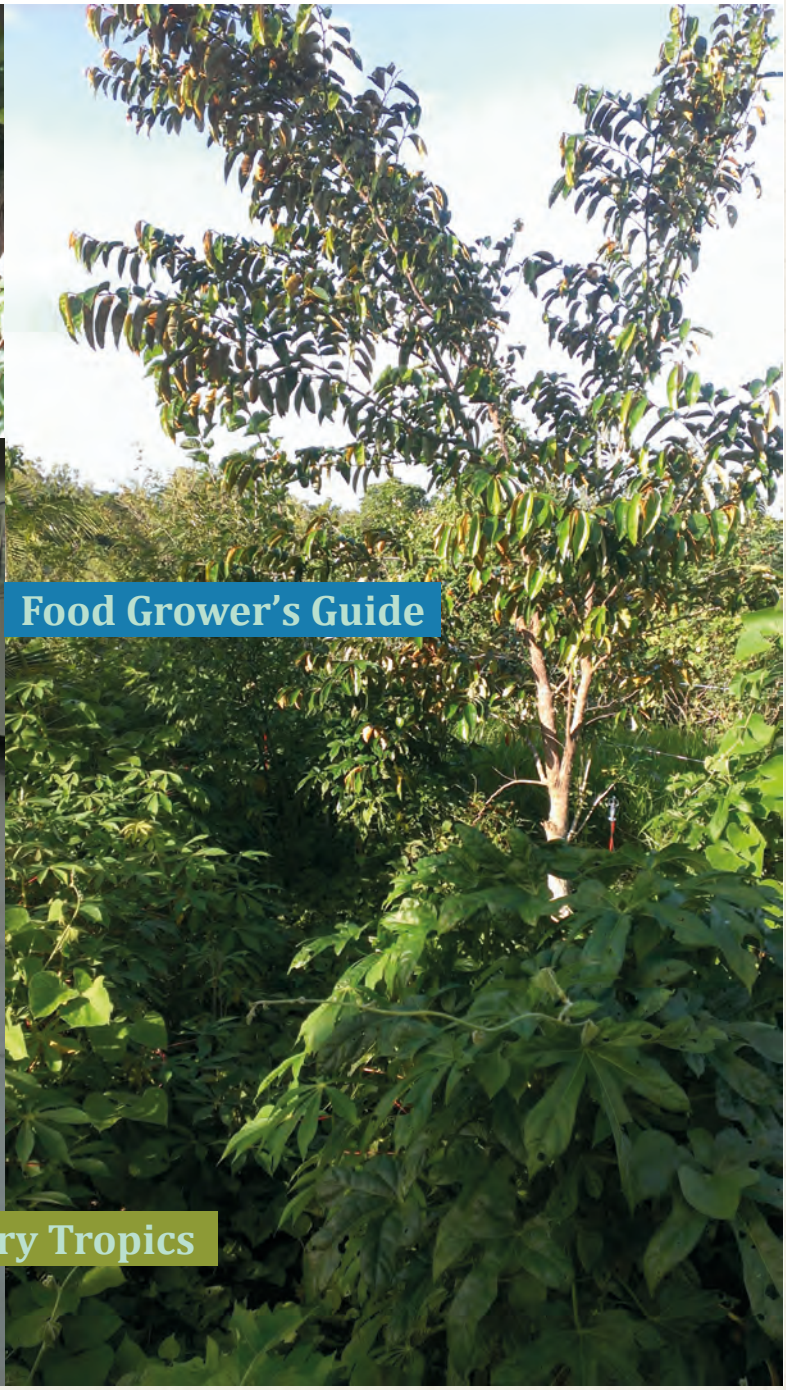
Citation

Seabrook W. The No-Mower Food Grower's Guide to Edible Landscaping in the Wet-Dry Tropics. (Brisbin J, Goebel R). Cooktown: Cook Shire Council, Australian Government; 2013.



Designing Edible Landscapes

No-Mower



Food Grower's Guide

for the Wet-Dry Tropics